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Geer

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(54) **GEOFENCED EVENT-BASED FAN NETWORKING: SYSTEMS**

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(71) Applicant: **BLEACHR LLC**, Edina, MN (US)

(72) Inventor: **Bradley C. Geer**, Edina, MN (US)

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Primary Examiner — Huy C Ho

(74) *Attorney, Agent, or Firm* — Beck Tysver Evans PLLC

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CPC **G06Q 30/0226** (2013.01); **G06Q 30/0212** (2013.01); **G06Q 30/0258** (2013.01); **H04L 67/10** (2013.01); **H04W 4/021** (2013.01); **H04W 4/04** (2013.01); **G06Q 50/01** (2013.01); **H04W 4/028** (2013.01); **H04W 4/08** (2013.01)

(58) **Field of Classification Search**

CPC H04W 24/00

USPC 455/456.3

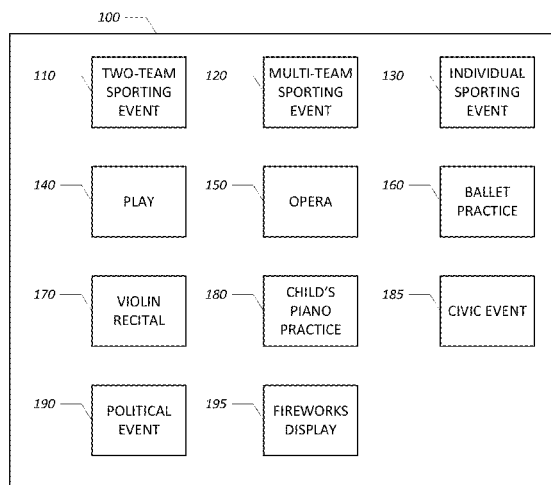
See application file for complete search history.

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ABSTRACT

The present invention is a fan networking system (FNS), available through a software application, executing on fans' portable smart devices for an event to be held in a venue. A FNS may offer event-customized services to fans, such as messaging, fan groups, mementos, coupons, "friends", and contests. The level of services might depend on whether a fan is attending; timing (pre-, during, post-performance); for a competitive event, whether the fan affiliates with the home or away team; and the category of fan (e.g., audience, management, performer). Determination of whether a fan is attending may be done with geolocation services, e.g., through GPS. A fan might need to remain within the venue for some period of time to qualify as attending. Services to attending fans may extend for a period beyond the event itself.

30 Claims, 25 Drawing Sheets



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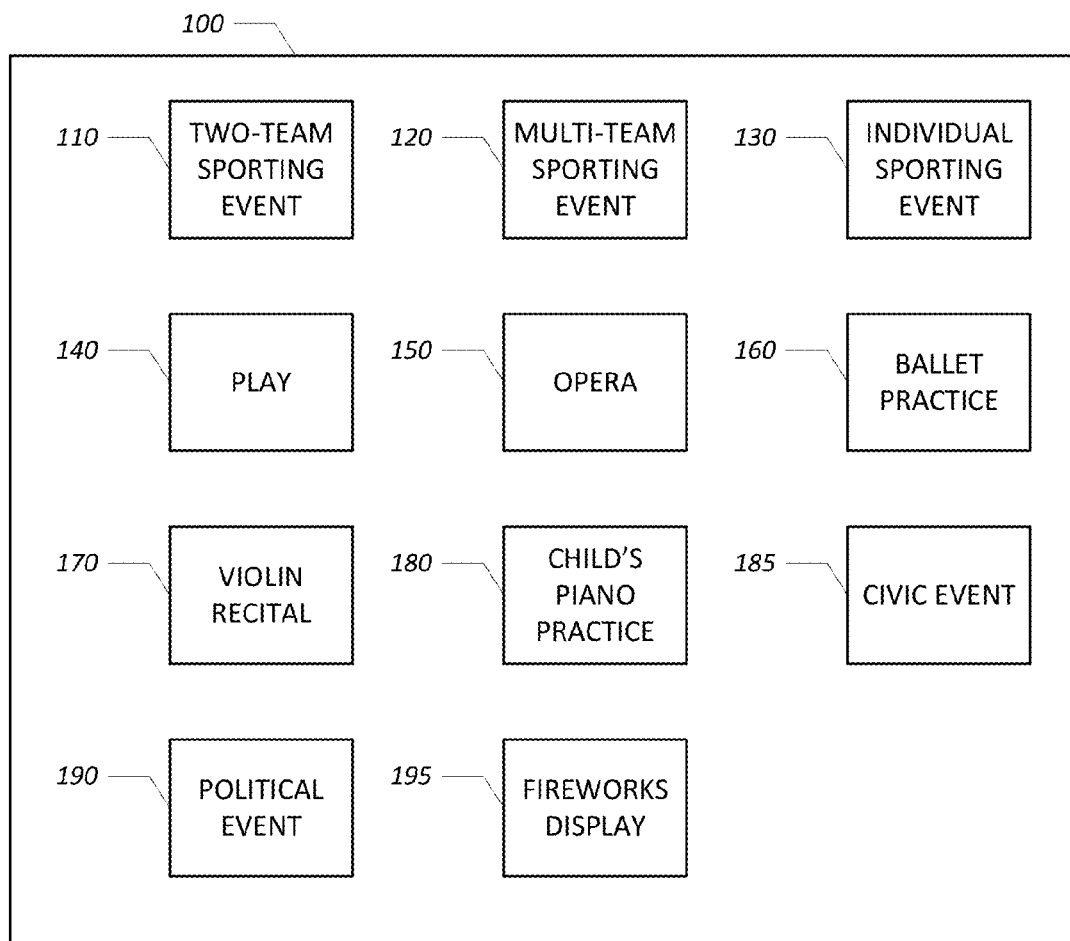
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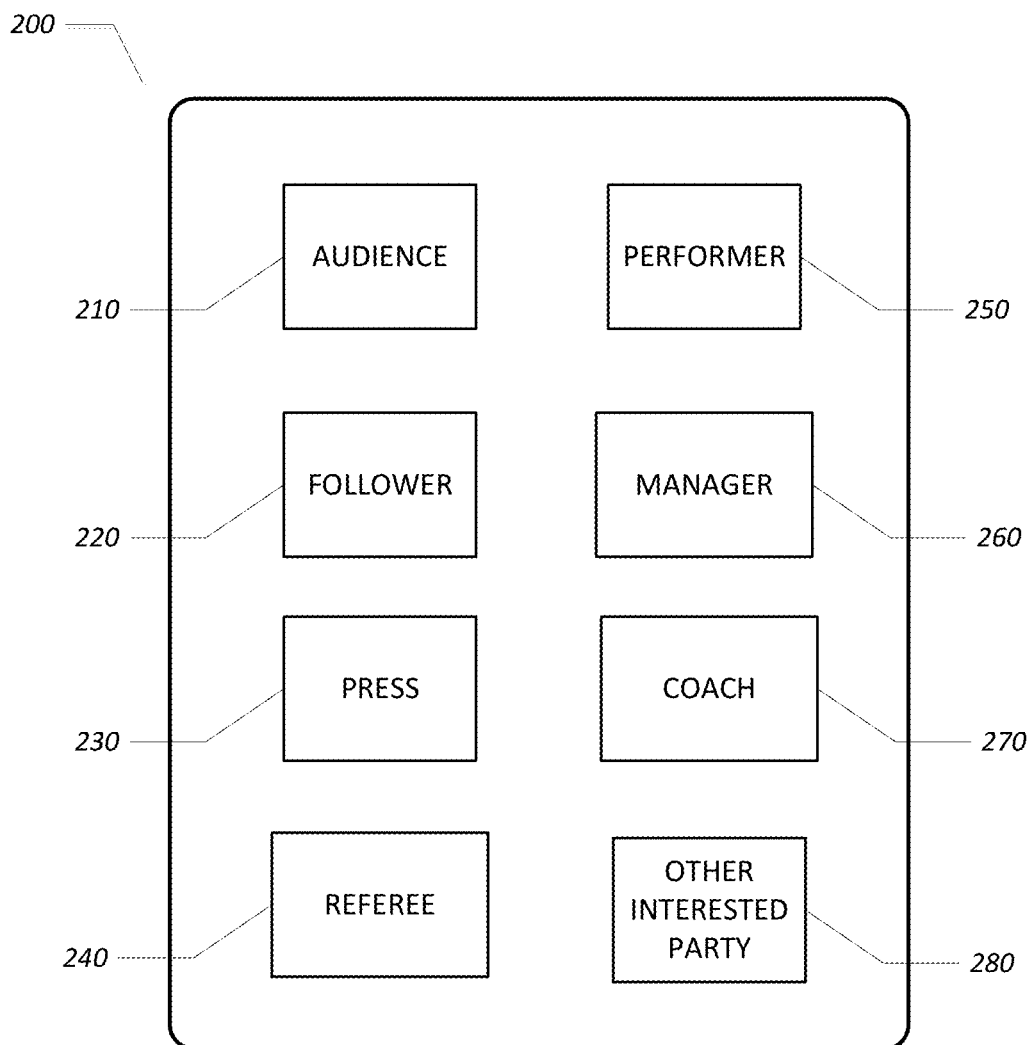
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**FIG. 1**

**FIG. 2**

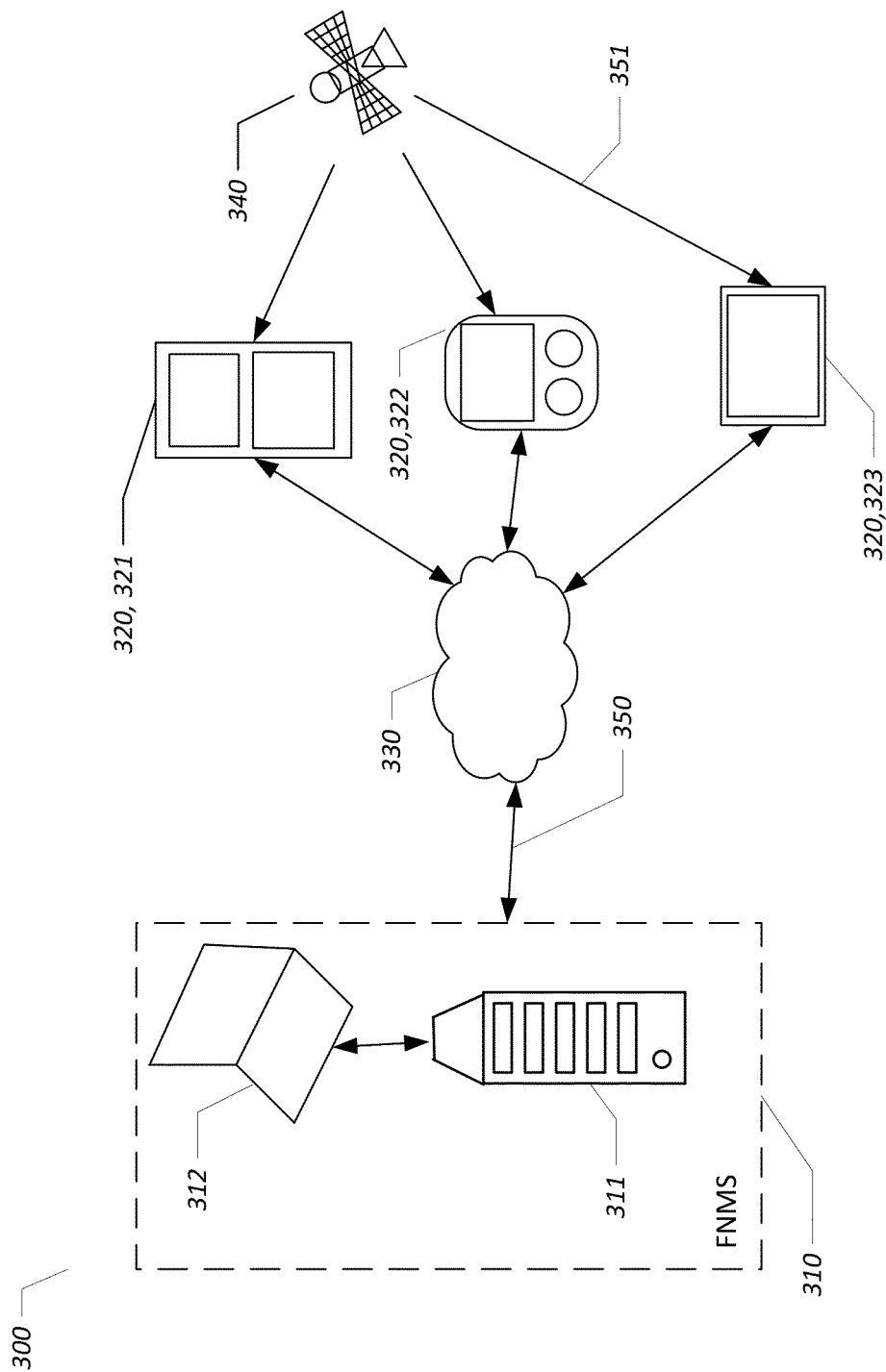


FIG. 3

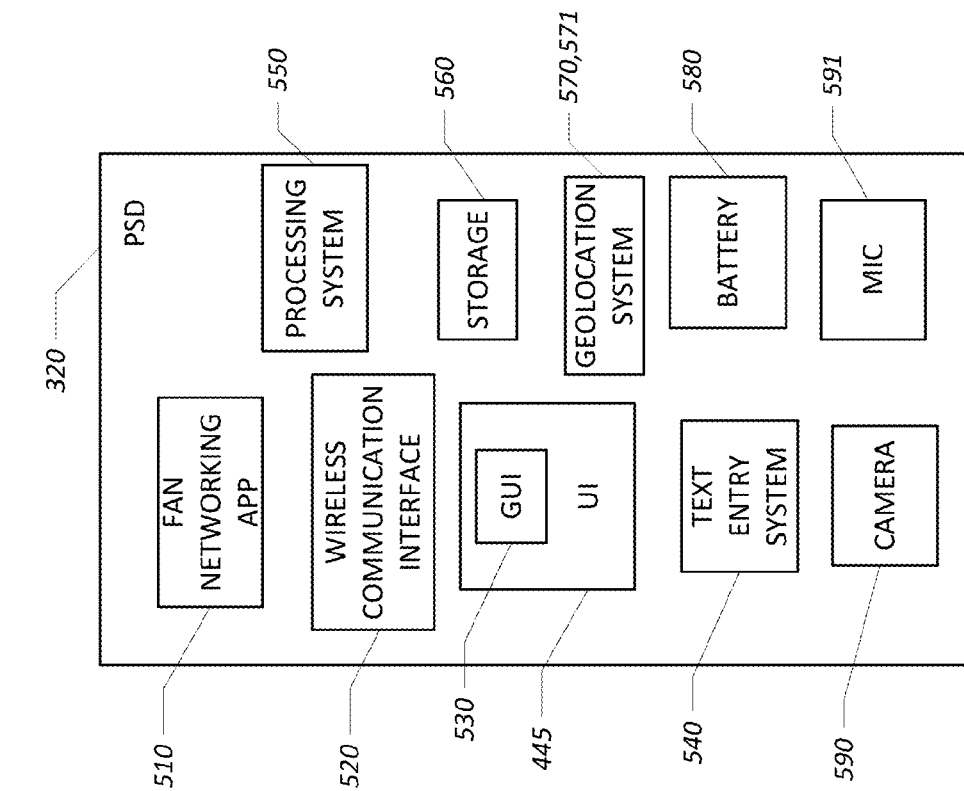


FIG. 4

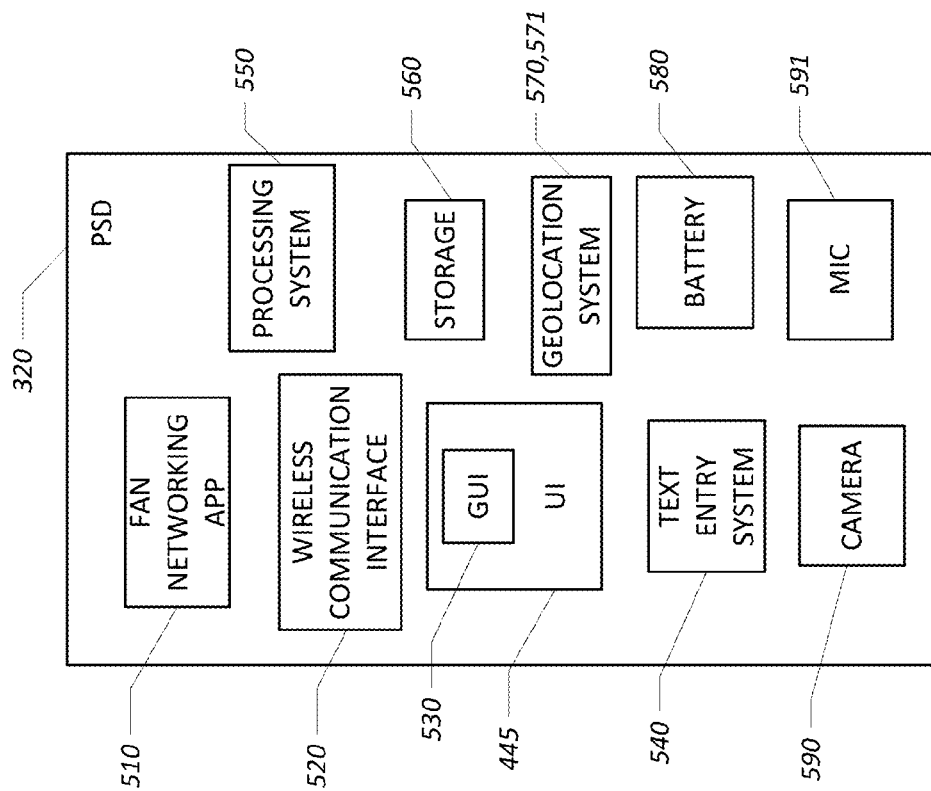
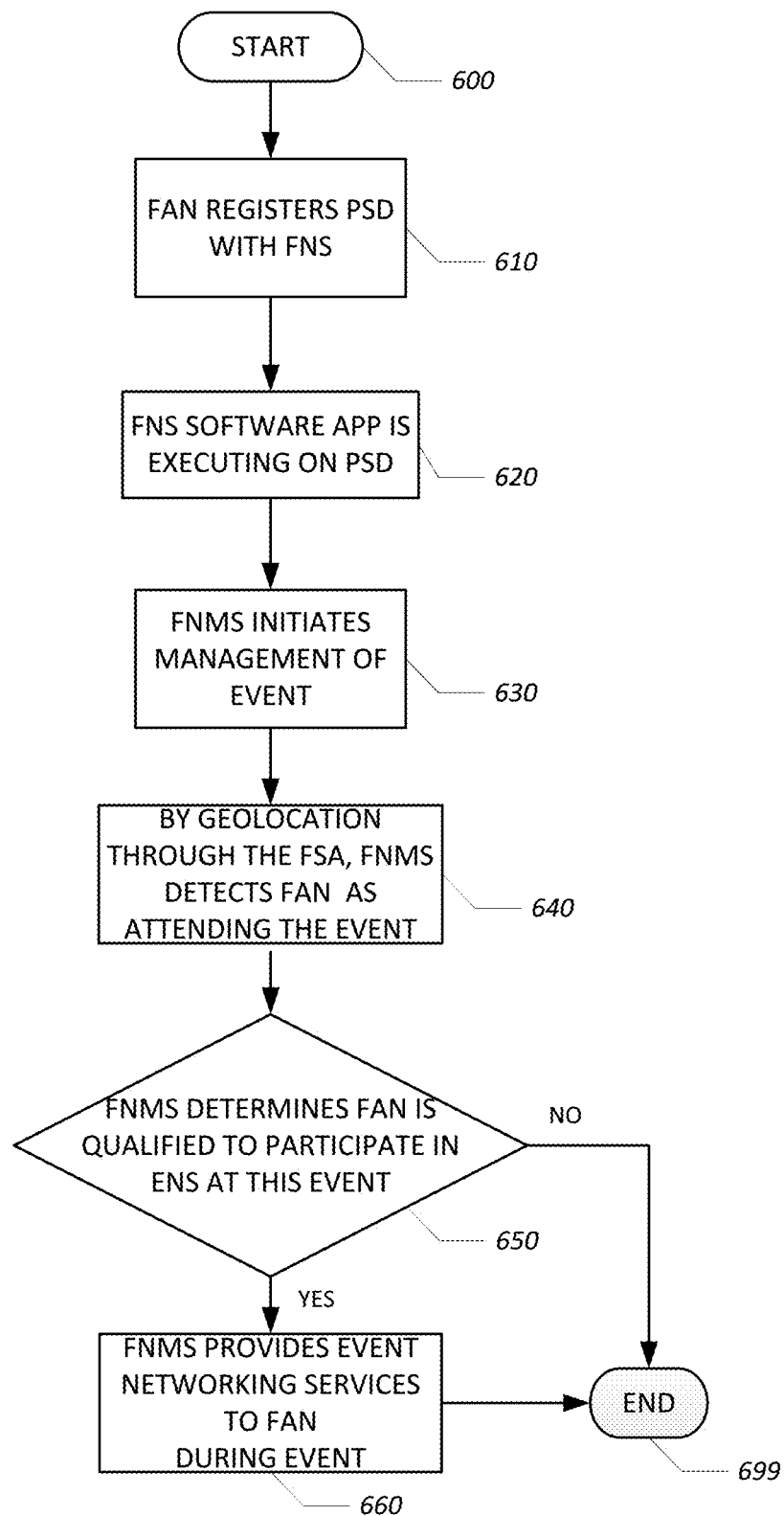
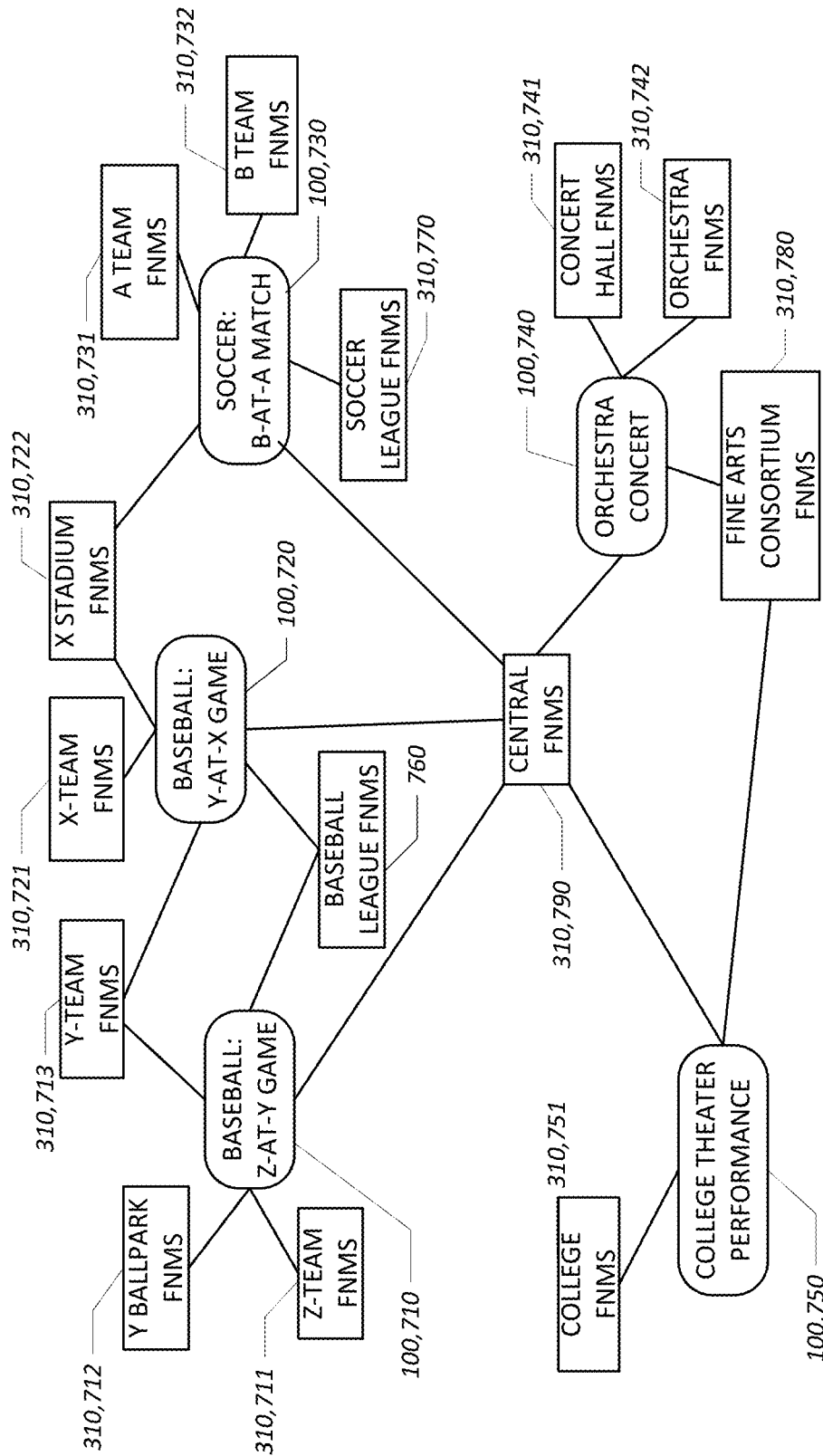


FIG. 5



**FIG. 7**

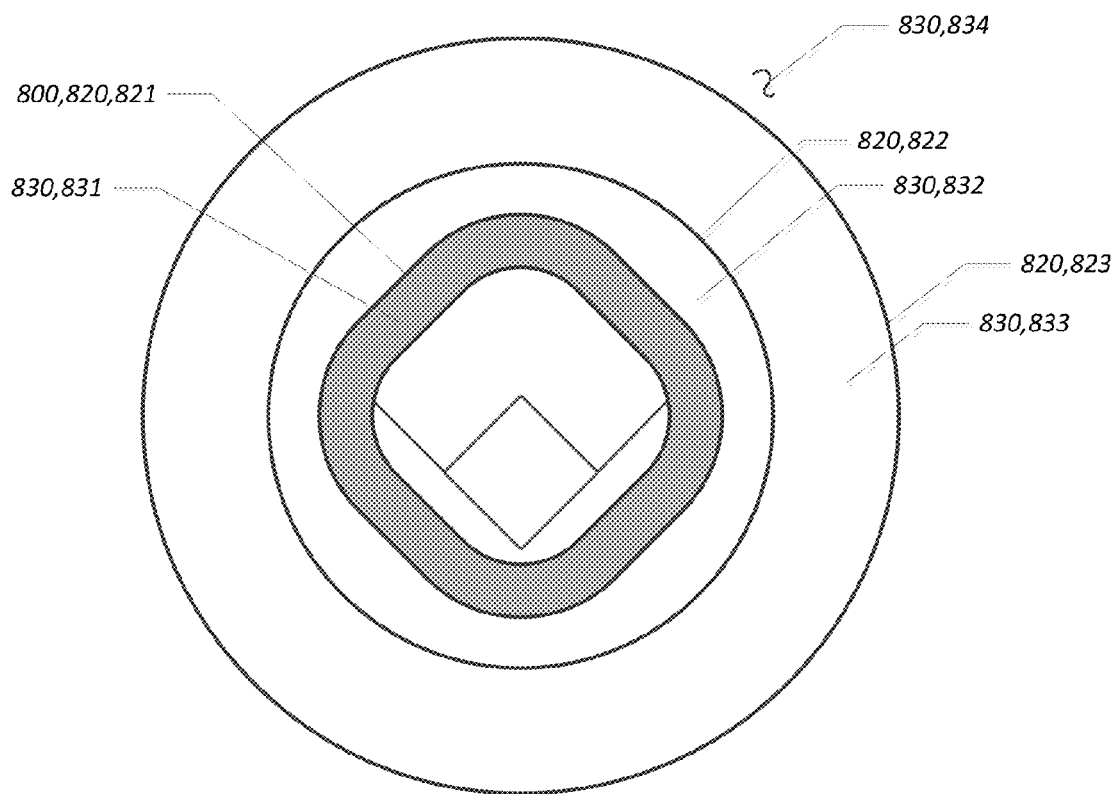


FIG. 8

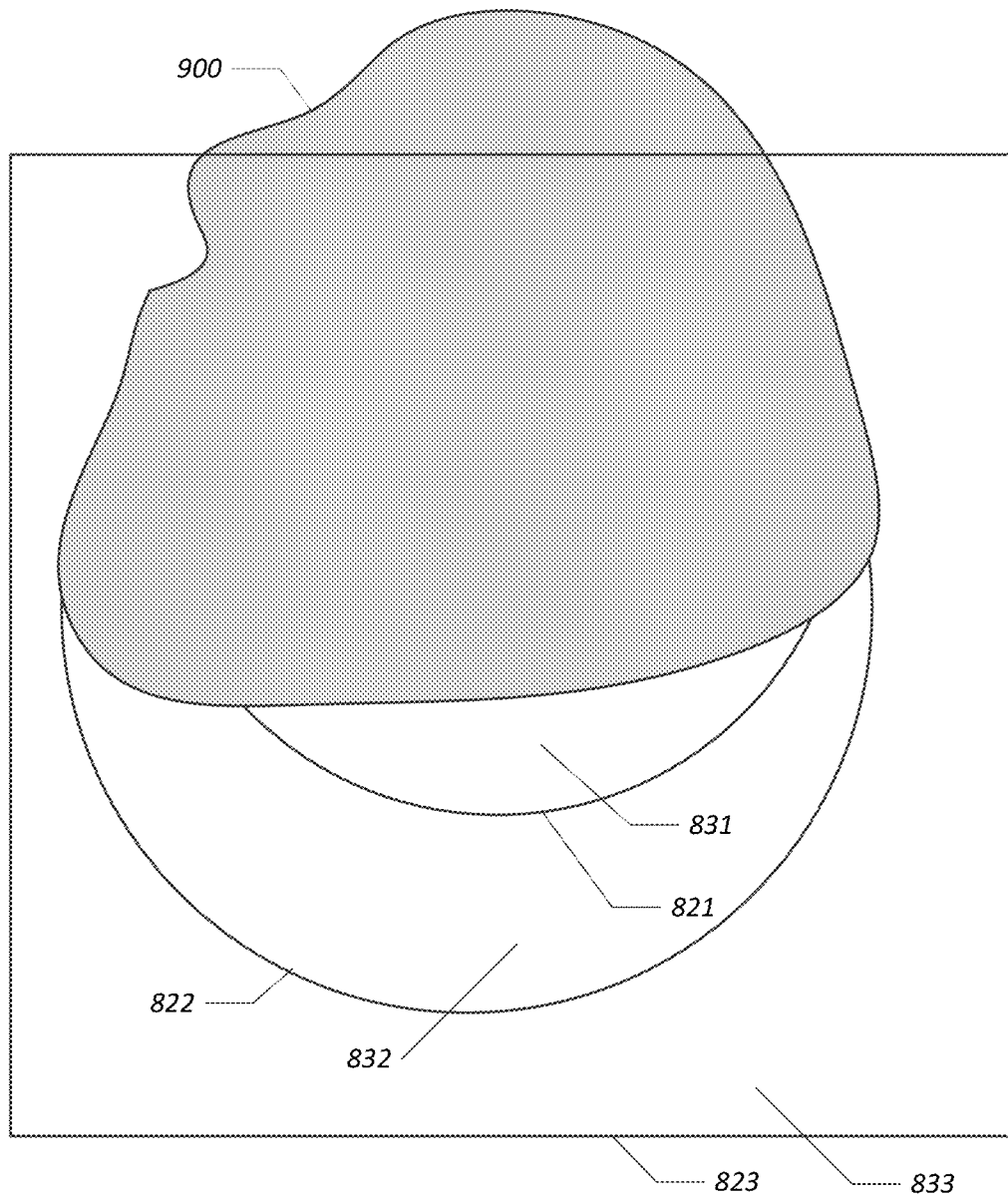
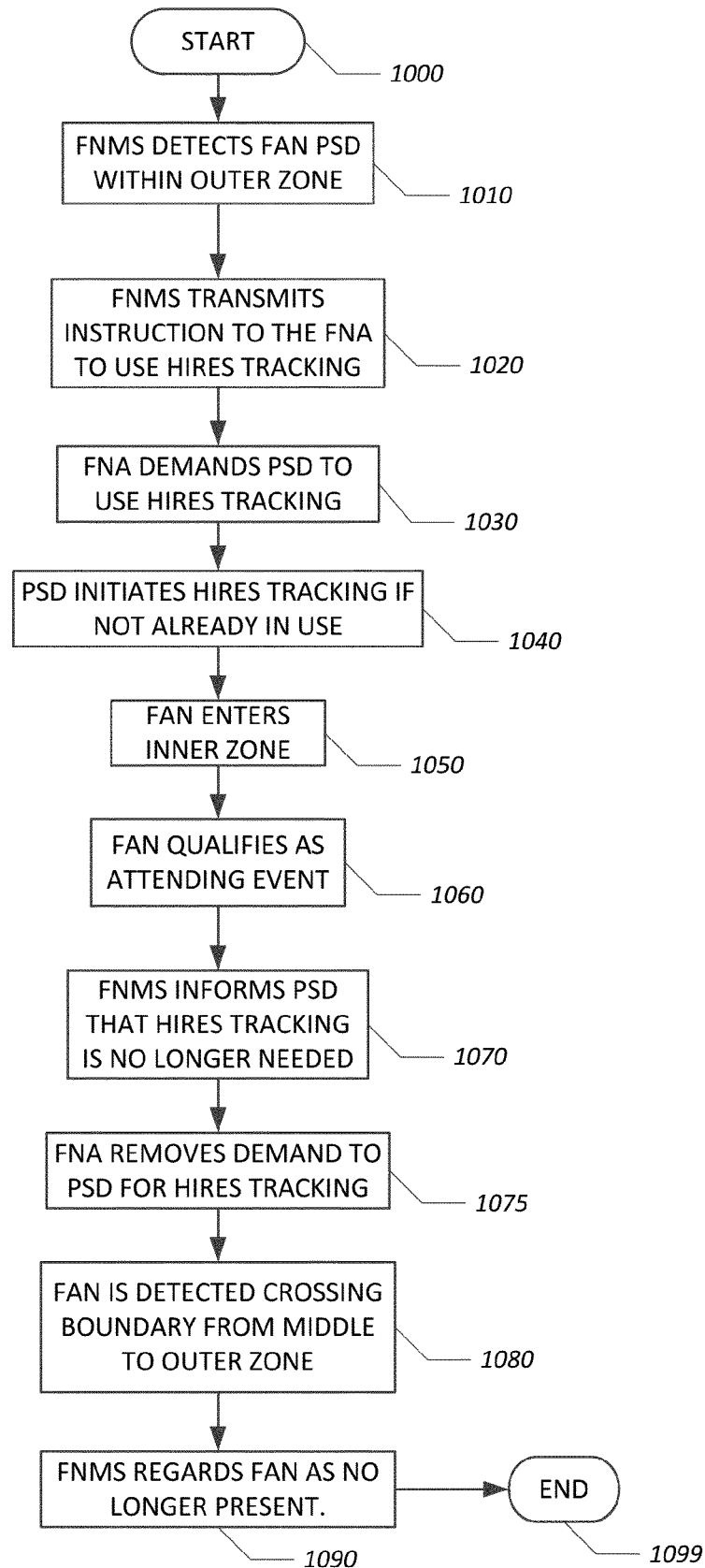


FIG. 9



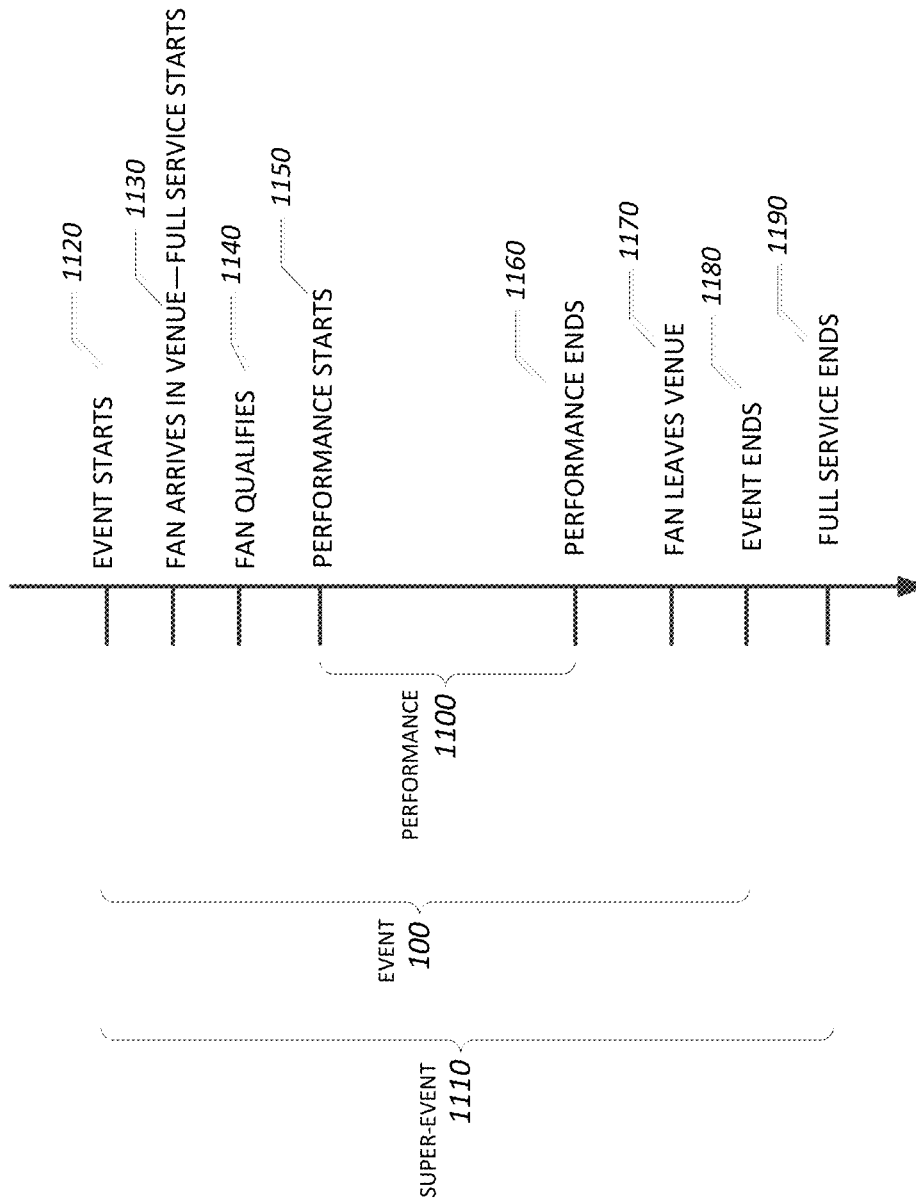


FIG. 11

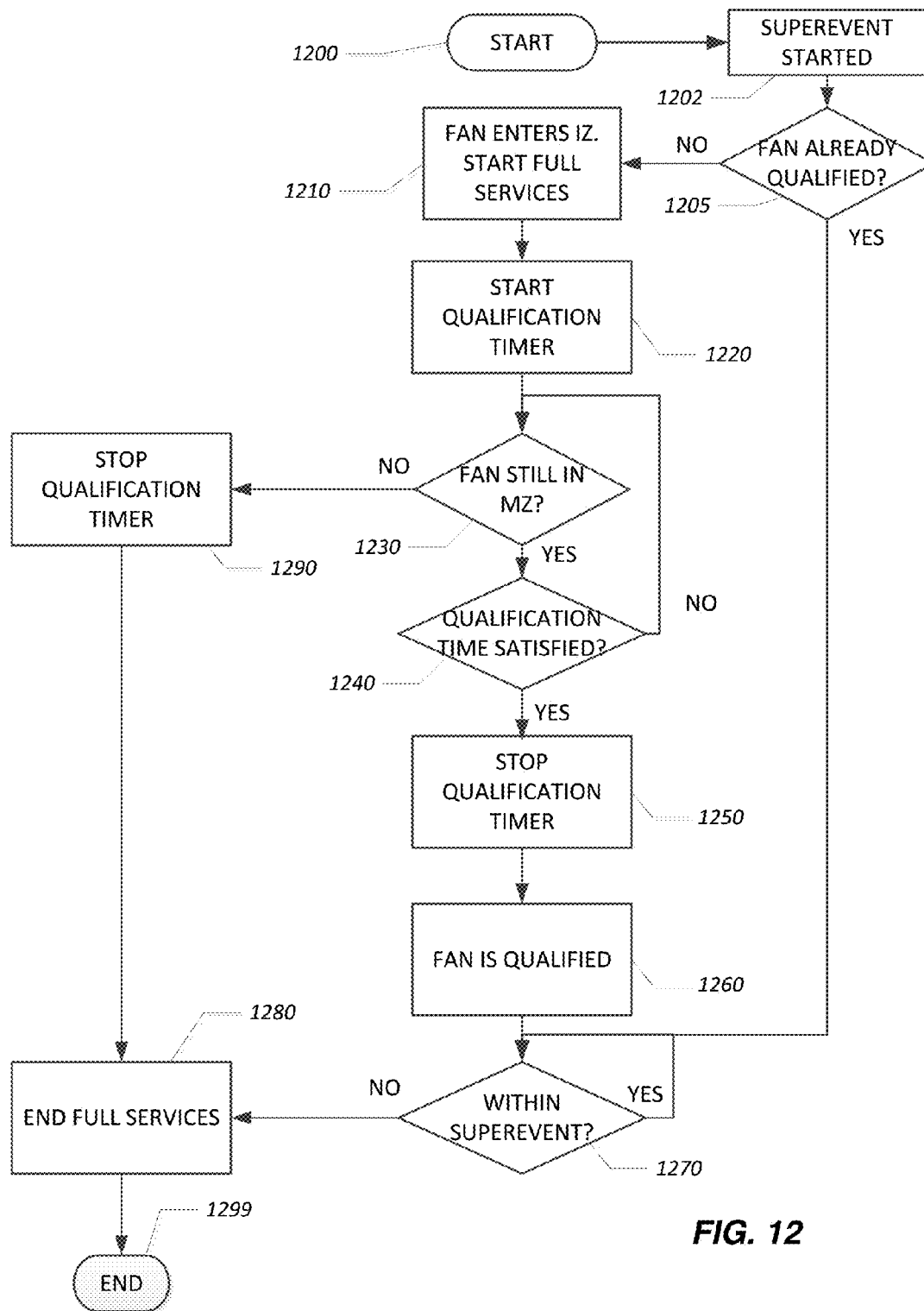


FIG. 12

1300		1310						1320			
		1311			1312		1321	1322	1323		
		TIMING			DEVICE LOCATION						
		DURING EVENT	QUALIFIED AS ATTENDING		INSIDE OB	INSIDE MB	INSIDE IB				
1330	1331	NO MONITORING	NO								
	1332	LORES MONITORING	YES	YES							
	1333	HIRES MONITORING	YES	NO		YES					
	1334	QUALIFYING	YES	NO				YES			
	1335	PRESENT	YES	YES			YES				
		1341		1342		1343					

FIG. 13

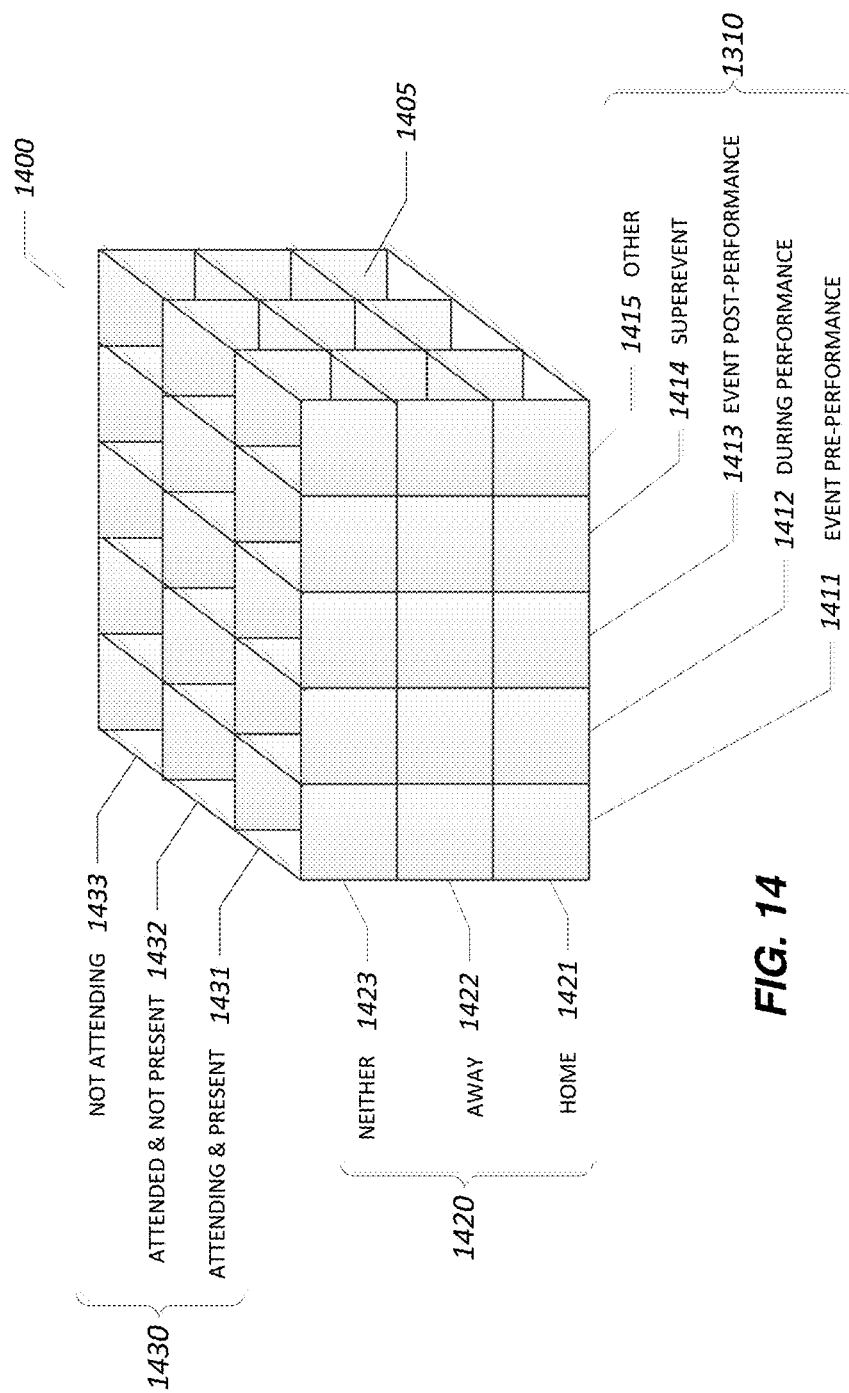
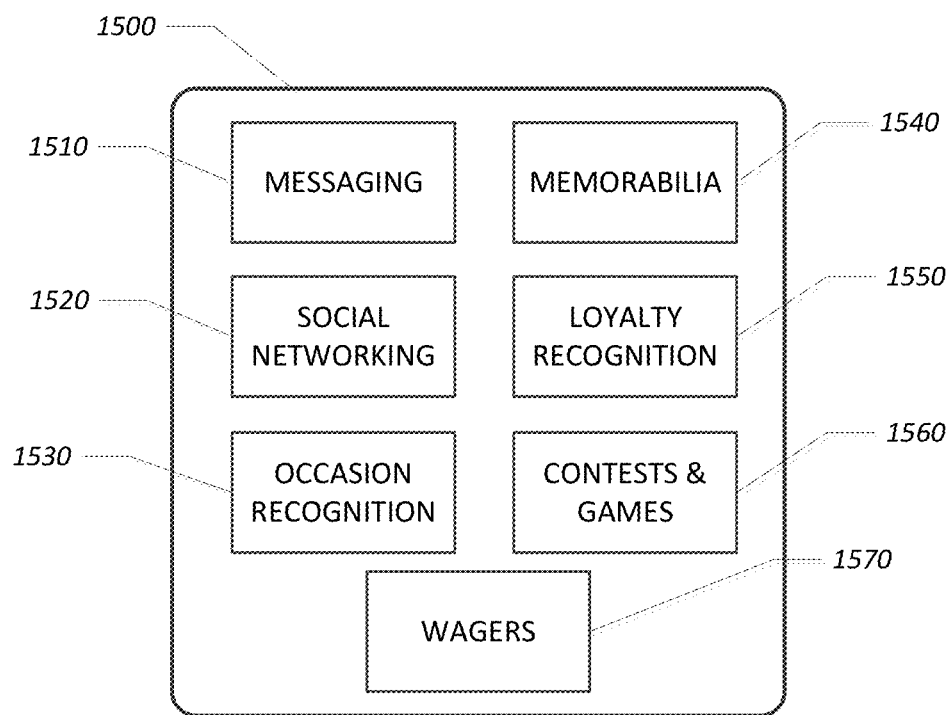


FIG. 14

**FIG. 15**

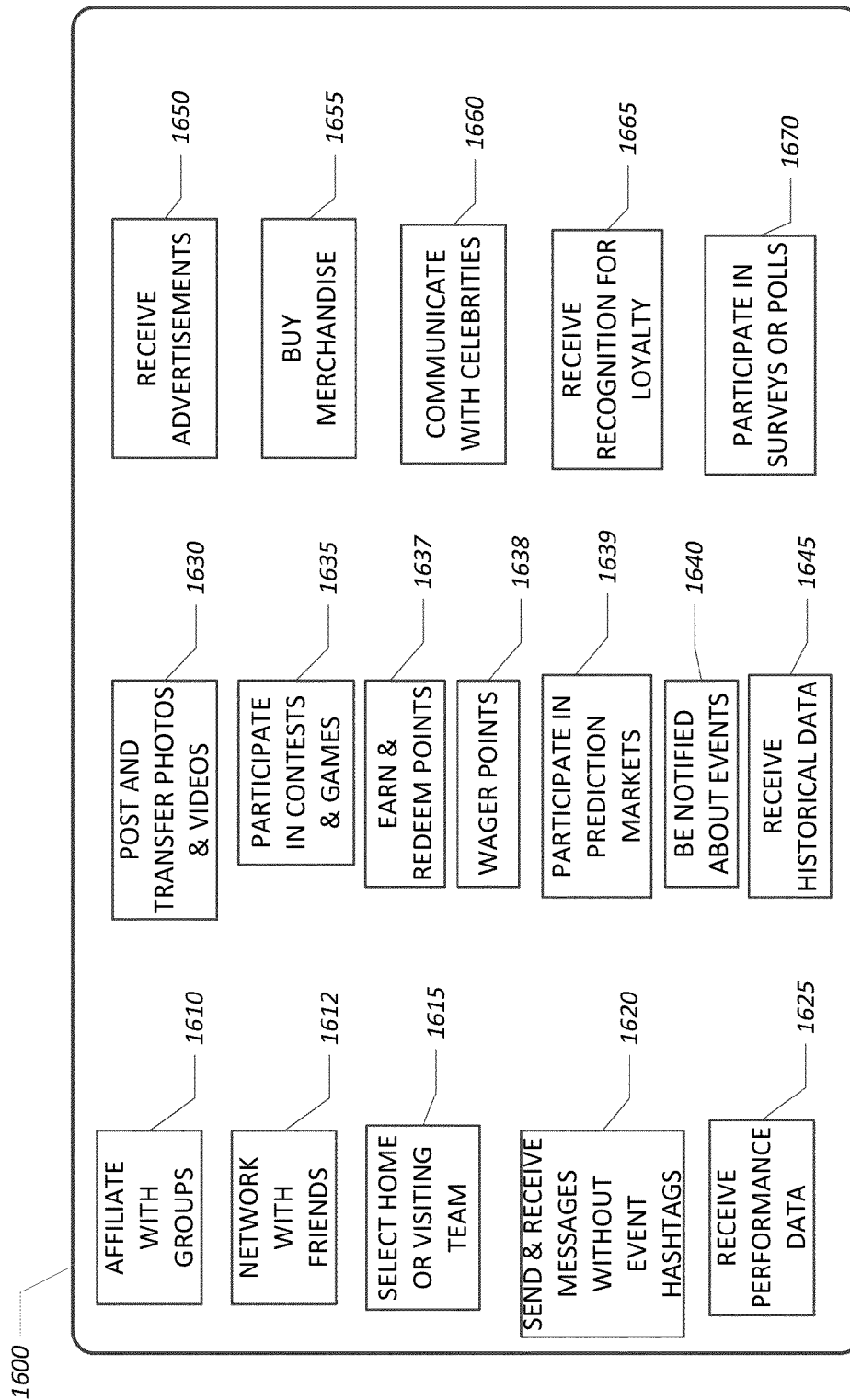
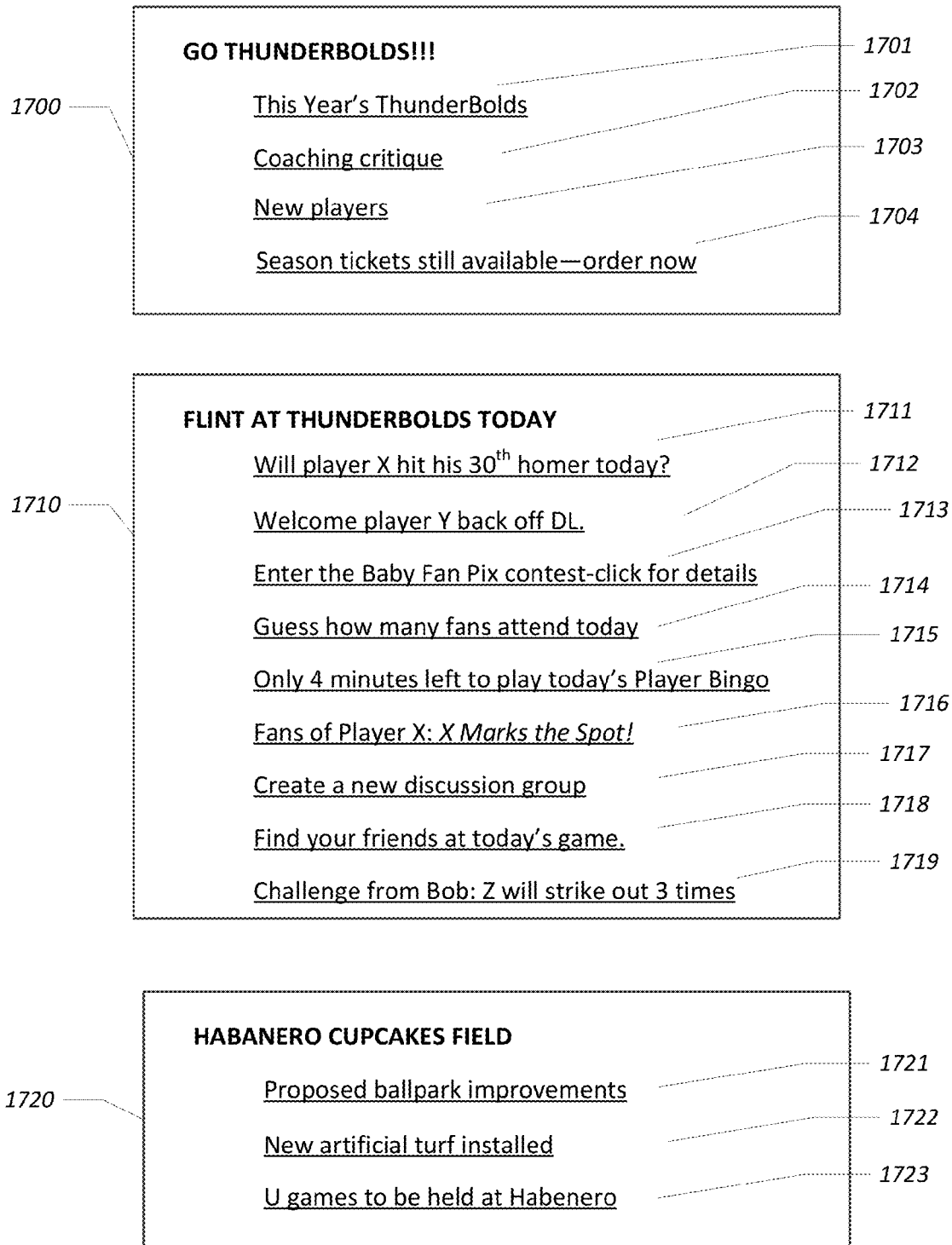
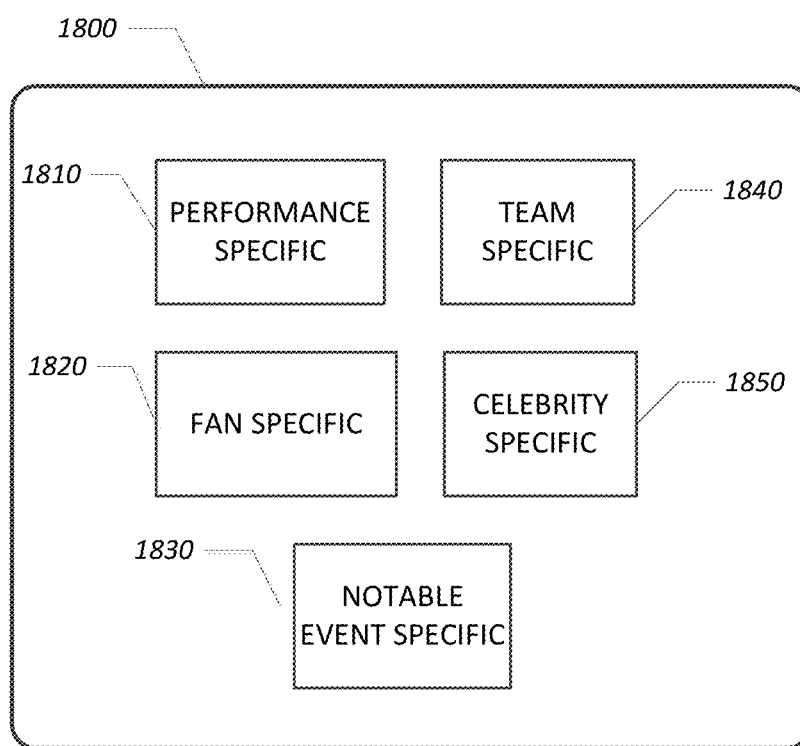


FIG. 16

**FIG. 17**

**FIG. 18**

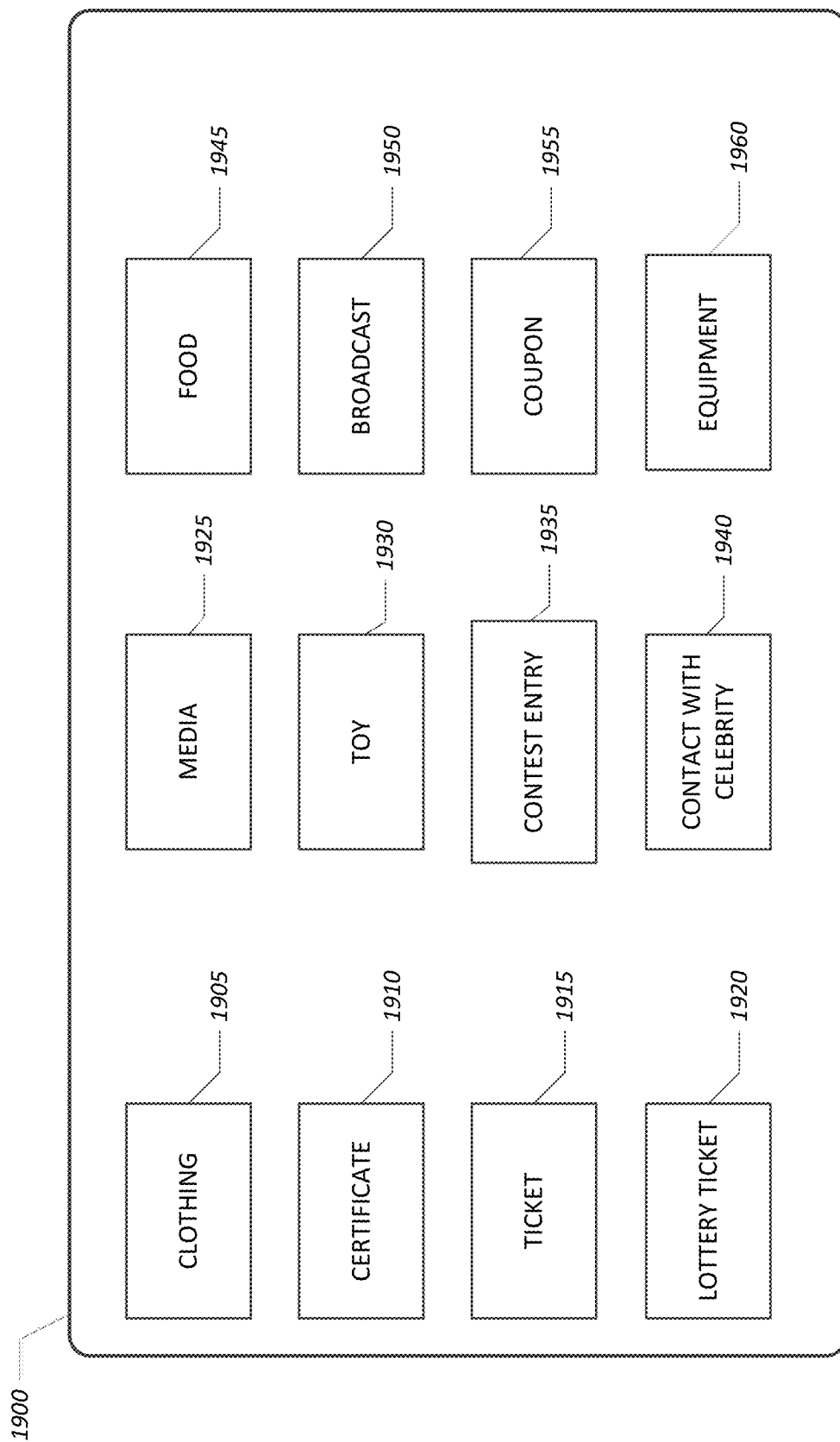
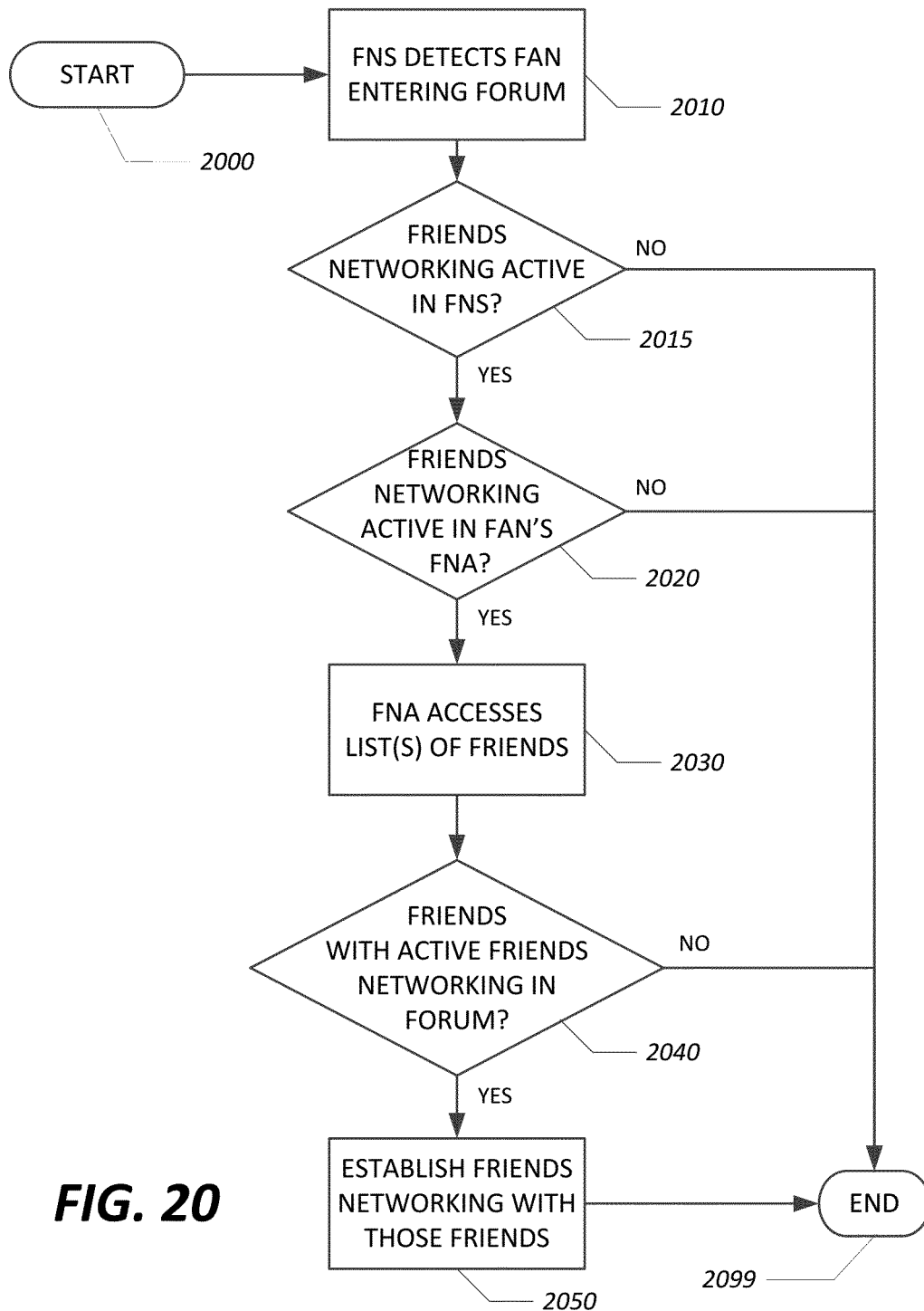
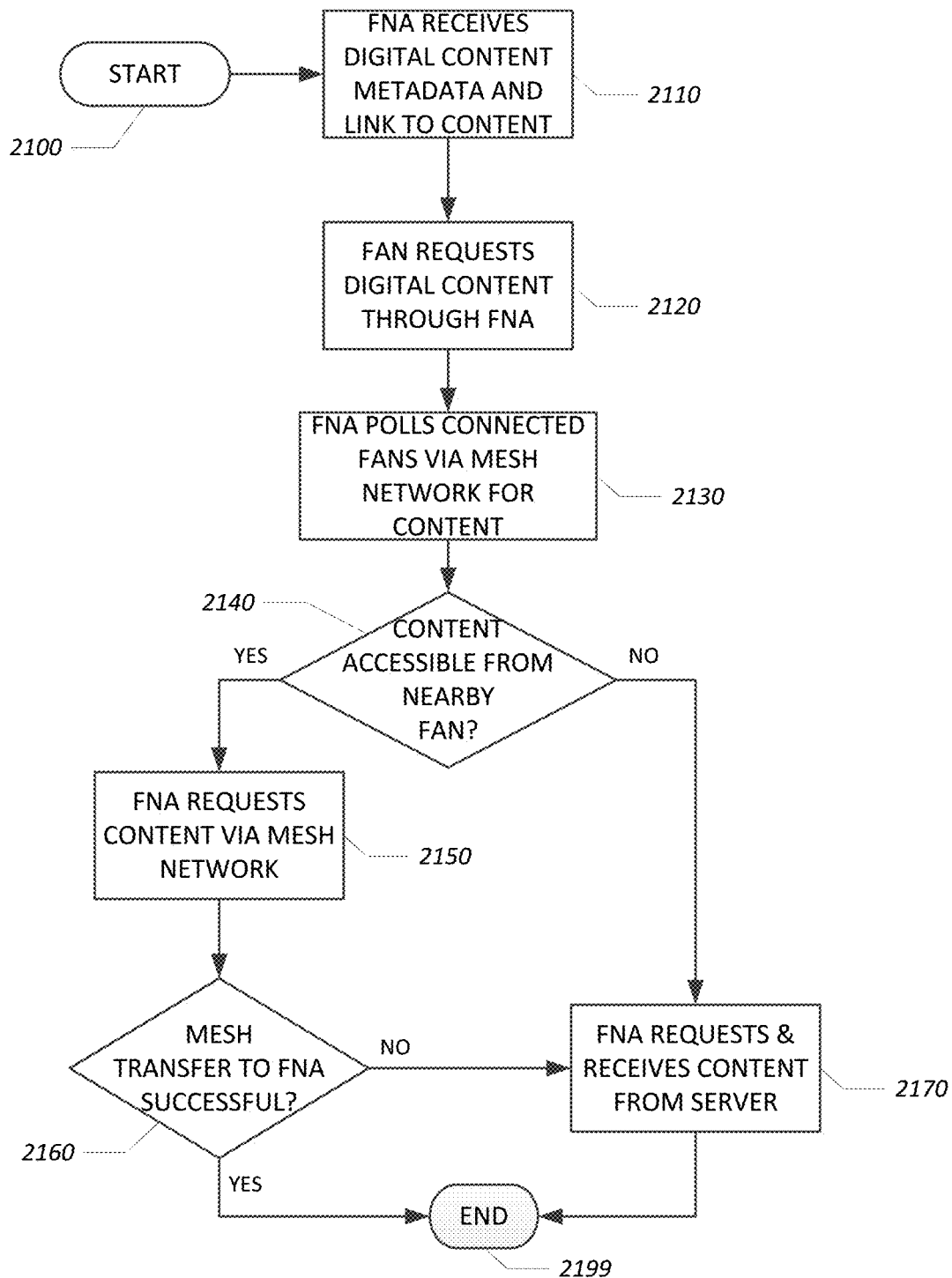


FIG. 19

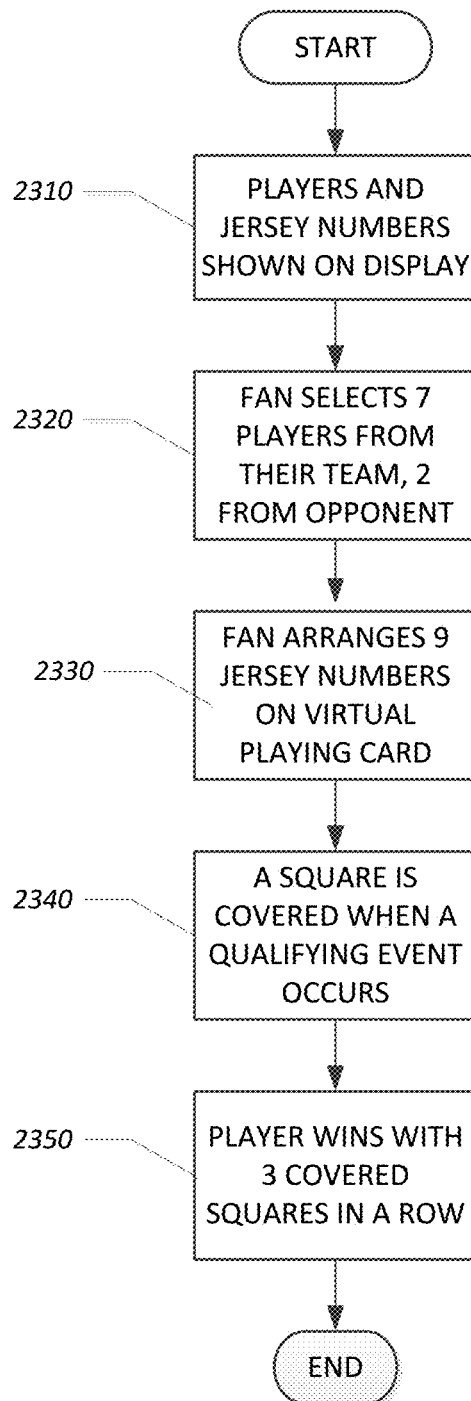


**FIG. 21**

2200

2220	V-5	H-10	H-64
2210	H-42	H-7	V-72
	H-31	H-25	H-14

FIG. 22

**FIG. 23**

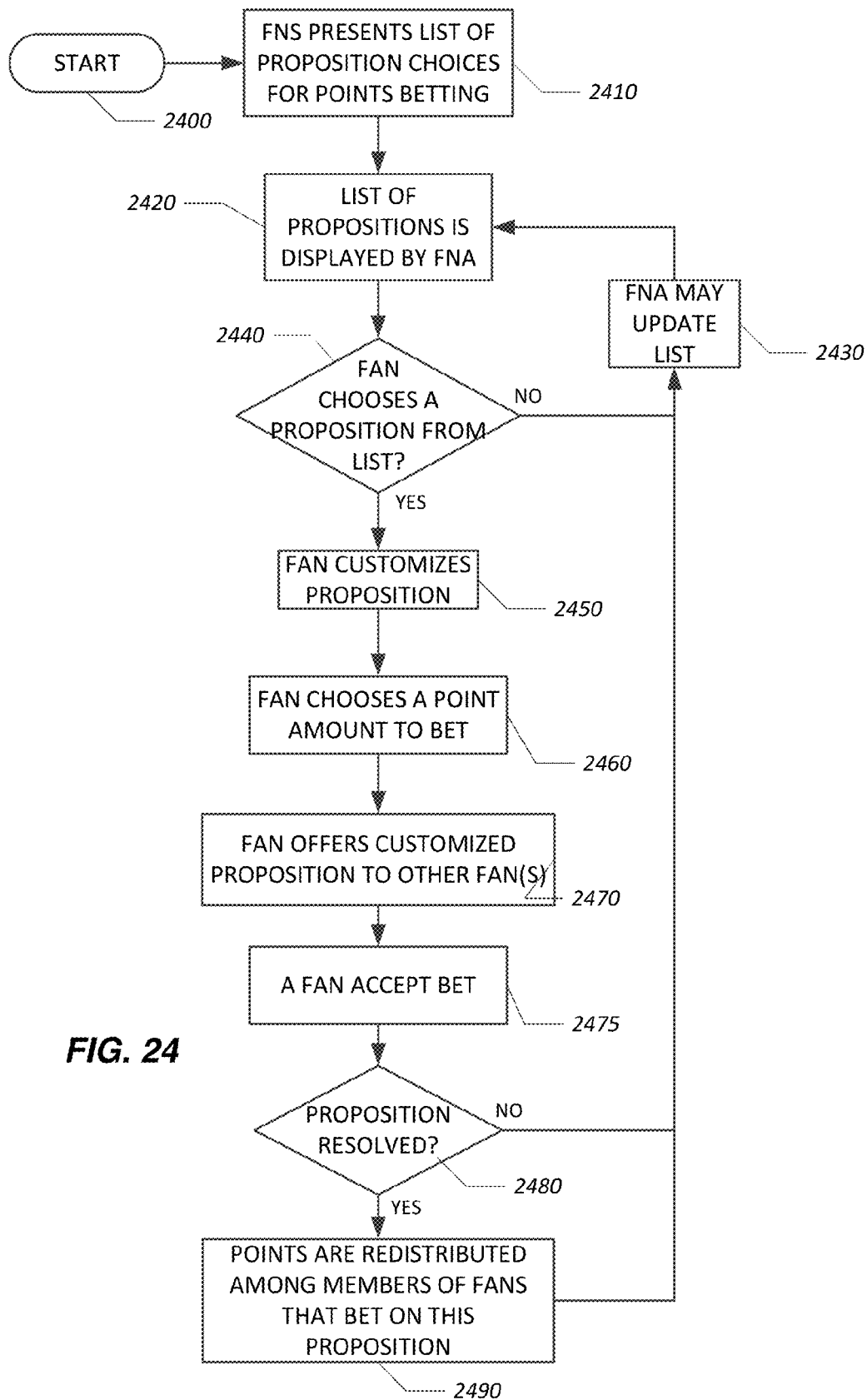
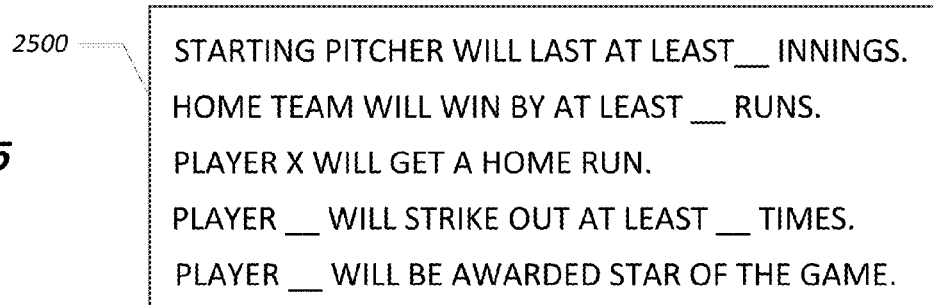
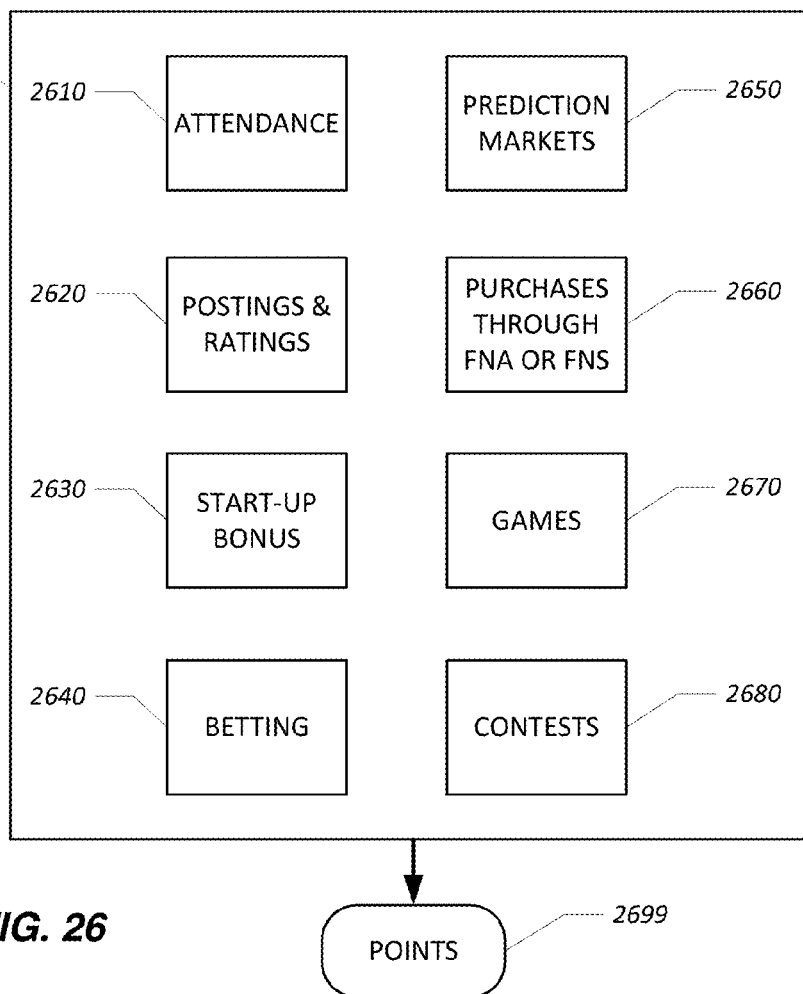
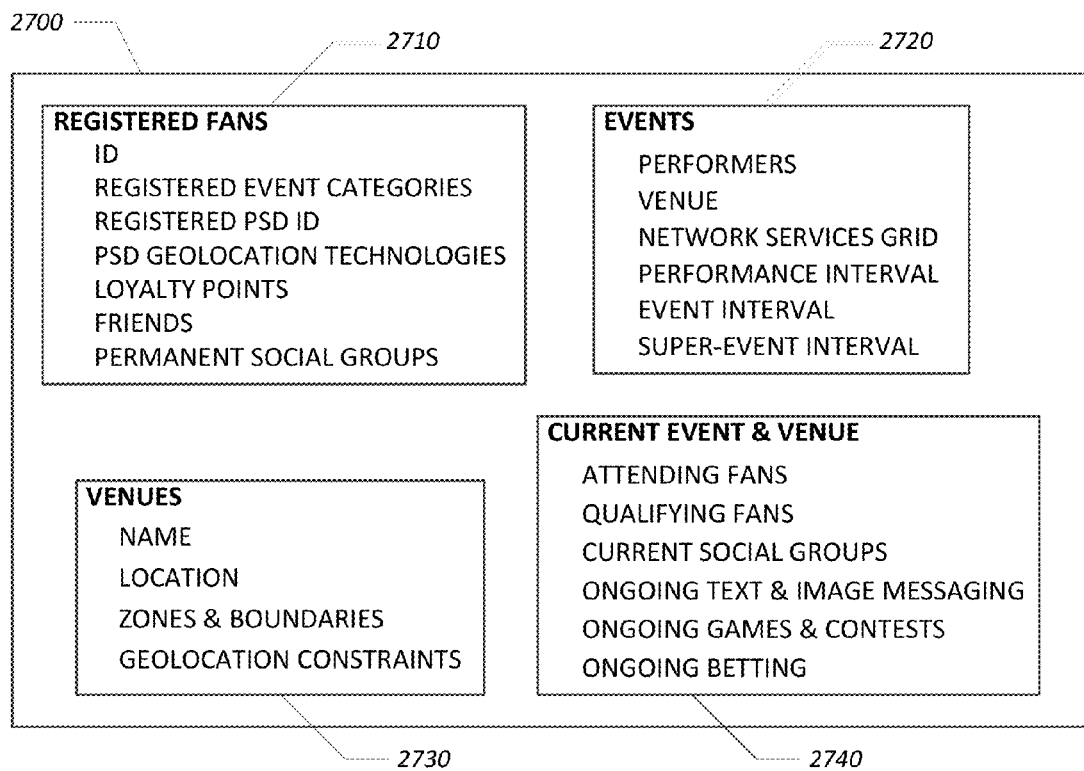


FIG. 25**FIG. 26**

**FIG. 27**

GEOFENCED EVENT-BASED FAN NETWORKING: SYSTEMS

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 61/954,093 filed Mar. 17, 2014, and entitled “Fan Networking Using Geofencing: System and Method”; and the benefit of U.S. Provisional Application No. 61/954,655 filed Mar. 18, 2014, and entitled “Fan Networking Using Geofencing: System and Method”. This application is related to U.S. application Ser. No. 14/618,512, filed Feb. 10, 2015, and entitled “Geofenced Event-Based Fan Networking: Methods”. This application is related to U.S. application Ser. No. 14/618,533, filed Feb. 10, 2015, and entitled “Geofenced Event-Based Fan Networking: Space-Time Dependence”. This application is related to International Application No. PCT/US15/15206, filed Feb. 10, 2015, and entitled “Geofenced Event-Based Fan Networking”. All five of these applications are hereby incorporated in their entirety by this reference.

FIELD OF THE INVENTION

The present invention relates to social networking at an event in a venue. More specifically, it relates to providing such functionality through geolocated portable smart devices that depends upon fan and event state.

BACKGROUND OF THE INVENTION

A portable smart device (PSD) is a portable electronic device having a processing system and a housing, which is conveniently carried by a human being on their person. Examples include a cellular phone, a portable music player, a tablet computer, an e-reader, a portable computer, a smart watch, smart glasses, or other wearable smart device. Typically, a PSD will have means for information entry—a user interface (UI), which might include a display, e.g., a touch screen; a keyboard; tactile controls; a camera; a microphone; a sound system; or tactile output, such as vibration. A PSD may have access to a network (e.g., a local, wide area, and/or personal network) through one or more wireless interfaces, such as WiFi, cellular network, or BLUETOOTH®. The processing system may include a processor, and various forms of tangible nontransitory computer-accessible storage. The PSD may facilitate geolocation of the device by one or more technologies, such as GPS, beacons, or cell phone towers, alone or in combination. Such a PSD can be tracked geographically, with varying accuracy depending upon the location technology(ies) used.

Logic on a PSD with GPS can determine its location and how its location changes over time. An application running on the PSD can transmit its location to a remote system. Thus, so long as GPS is enabled, such a device can be tracked, often with 10 m horizontal resolution or better. GPS location is available in many places outdoors, but might not be available inside some buildings. Within a building, beacons or other technologies may be viable for tracking a PSD.

Some PSDs have multiple modes of location services, a high resolution (HIRES) mode and at least one low resolution (LORES) mode. A LORES mode provides less location accuracy than HIRES mode, but uses fewer or different resources of the PSD, and so consumes less electricity. Typically, electricity is provided to a PSD by a battery that must be recharged periodically. Useful battery life between charging events can

be short. A software application running on the PSD can specify to the operating system when it requires HIRES mode and when LORES mode is adequate. When a LORES mode is adequate for one application, another application might still require the operating system to keep the PSD in HIRES mode. Thus, while HIRES tracking can be demanded by a PSD, transition from HIRES to LORES mode can merely be suggested. Access to these location tracking levels and functions may be provided to software executing on the PSD as services by its operating system.

SUMMARY OF THE INVENTION

The present invention is a fan networking system (FNS), available through a social networking application (SNA) dedicated to fans of some event or collection of events, and implemented by a software application on their PSDs—i.e., a fan networking app (FNA). The FNA, interacting with a fan through the UI of the PSD, is a proxy for the fan. Exemplary events include a sports competition, an orchestra concert, a state fair, or a day at an amusement park. A FNS offers customized services to fans, such as messaging, fan groups, friends networking, mementos, coupons, and contests. Such services might be customized, based, for example, upon event(s), venue(s), or team(s). The level of event networking services (ENSs) offered by a fan network management system (FNMS), a facility central to the FNS, might depend on the type of event; whether a fan is attending; fan geographic location relative to a venue; timing (pre-, during, post-performance); for a competitive event, whether the fan affiliates with the home or away team; and the category of fan (e.g., audience, management, performer). A fan might need to register with the FNMS to access ENSs. Determination of whether a fan qualifies as attending an event, and the fan's position in or near venue, may be done with geolocation of their PSD, e.g., through GPS. A fan might be required by the FNMS to remain within the venue for some period of time to qualify as attending. Services to attending fans may extend for a period beyond the event itself; some services might be extended to fans who are not in attendance.

In some embodiments, the FNA may determine whether social networking “friends” of an individual are present at the performance or event. Declaring another person to be a “friend” (or some similar term, such as “follower” or “contact”) might be done through another social networking application (SNA), such as FACEBOOK® or LINKEDIN®. The FNS may have access to, and take advantage of, lists of friends from other SNAs. The FNMS might then facilitate communications directly among the friends, as well as communication with attendees at large. Special services or benefits might be offered to groups of friends.

A FNMS might manage, in any combination, ENSs for a single event; a group of events; or for a set of groups of events. For example, the FNMS might manage all events of a particular team; or a particular league; or a particular venue; or a particular set of forums; or any combination of teams, leagues, venues, forums, performers, or groups of performers. The FNS, through the FNA, might give the user access to any subset of events that it manages. There may or may not be charges for registration with the FNMS, or charges for FNS participation at some or all events or collections of events. These charges might be collected by the FNMS through the FNA. The fan, through the UI of the FNA on their PSD, might be able to configure which events or groups of events for which they choose to access fan networking from access provided by the FNA. The FNMS might provide ENSs for some subset of those events to which they provide access to

the fan. For example, a fan of a baseball team might have fan networking at all games of the league that includes the team. The FNMS might conceivably provide fan networking access for a given user to all events for which the FNS is implemented, simply detecting through their FNA the presence of fans at such events. Thus, a single FNA might automatically provide ENSs to a given fan at a wrestling match and at a ballet by detecting their attendance through one or more FNMSs.

The FNS might confer “points” on fans for various reasons. For example, a fan might accrue points for attending events. A fan might get bonus points for some achievements, such as attending enough games within a season to be considered a “super-fan”. The points might be awarded for events of the same type (e.g., all games of a given baseball team); or for events of multiples types (e.g., all events managed by a FNMS). A fan might accrue points for making certain purchases; for initially joining the FNS; or for participating in certain contests, games, or competitions. Points might be redeemable for goods, services, or cash. A fan may be able to wager points against other fans or groups of fans on, for example, certain outcomes in a game; or participate in a prediction market relating to the event. What is permissible with regard to points may vary among legal jurisdictions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows exemplary types of events for which a FNS might be provided.

FIG. 2 is a conceptual diagram that illustrates exemplary types of fans (interested parties).

FIG. 3 is a conceptual diagram illustrating communication among components of an FNS, including a PSD, which executes a FNA, and a FNMS.

FIG. 4 is a block diagram illustrating a FNMS.

FIG. 5 is a block diagram that illustrates exemplary components of a PSD that might be used to provide event networking services to a fan.

FIG. 6 illustrates an embodiment of a process whereby a FNMS provides, and a fan receives, ENSs.

FIG. 7 illustrates various possible levels of FNMSs that might provide fan networking services to a variety of exemplary events or performances.

FIG. 8 illustrates an exemplary event venue, geofenced boundaries, and geofenced regions.

FIG. 9 illustrates another exemplary event venue, geofenced boundaries, and geofenced regions.

FIG. 10 is a flowchart that illustrates how zones might be used to reduce battery usage for geolocation, while avoiding providing networking services to people who have not qualified to receive them.

FIG. 11 is a timeline depicting exemplary occurrences that delineate a performance, an event, and a super-event; i.e., a duration of ENSs targeted to fans who are attending, or who attended the event.

FIG. 12 is a flowchart that illustrates an exemplary process, which might be required by a FNMS, whereby a fan can qualify as attending an event.

FIG. 13 is a table that illustrates possible effects of timing and location of the PSD of a fan upon monitoring level, and upon state of the fan as present, or as qualifying to be present, for an event.

FIG. 14 is a conceptual diagram that illustrates exemplary factors which might be used to determine the “state” of a fan relative to an event, for selecting types and levels of functionality offered to them.

FIG. 15 is a conceptual diagram that illustrates exemplary categories of event networking services that might be provided by a FNS to fans, with the types of functionality available to a fan depending upon their current state relative to an event.

FIG. 16 is a conceptual diagram that illustrates exemplary services that might be provided by a FNS within the social networking category.

FIG. 17 shows examples of opportunities, provided by a FNS to fans attending an event, for team-based messaging, event-based messaging, venue-based messaging, games, contests, wagering, and “friends” networking.

FIG. 18 is a conceptual diagram that illustrates ways that memorabilia offered to fans might be customized through a FNS.

FIG. 19 is a conceptual diagram that illustrates types of memento products that might be offered to, and in some cases customized by, fans through a FNS.

FIG. 20 is a flowchart that shows how social networking “friends” might be identified by, and interact through, a FNS.

FIG. 21 is a flowchart illustrating sharing of digital content among fans using mesh networking.

FIG. 22 is an exemplary game board that might be used in a game managed by a FNS.

FIG. 23 is an exemplary set of rules that might be used by a FNS in conjunction with the game board of the previous figure.

FIG. 24 is a flowchart illustrating a process for wagering points among fans of a FNS.

FIG. 25 illustrates a list of propositions relating to a baseball game, some customizable, from which a fan might select as the basis for a wager.

FIG. 26 illustrates possible elements of a loyalty program, whereby a fan might earn points to be redeemed for goods, services, cash, or recognition.

FIG. 27 illustrates exemplary kinds of data that might be maintained by a FNMS.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

This description provides embodiments intended as exemplary applications of the inventive concept. The reader of ordinary skill in the art will realize that the invention has broader scope than the particular examples described here.

In this description and claims, the word “store” means store in tangible nontransitory computer-readable storage. By “storage” we mean tangible nontransitory computer-readable storage. By “download”, we mean download from a remote system using a wireless communication system; the communication system might be the Internet or some other system or combination of systems. By “data”, we mean information stored in, or accessed from, storage. By “database”, we mean a collection of data that are somehow interrelated. By the word “or” we mean “inclusive or”, unless it is clear from the context that “exclusive or” is intended; so “A or B” means A, B, or A and B.

Some of the drawings are flowcharts. The flowcharts are merely illustrative of processes. Within the scope of the invention, the order of steps in a flowchart may be changed; steps may be omitted; different but similar or equivalent steps or groups of steps may be performed; or other steps may be added.

Reference numerals are keyed to the figure of first appearance of the item to which they refer. So, for example, item 1200 appears in FIG. 12, and item 800 appears in FIG. 8.

FIG. 1 shows exemplary types of events **100** for which a FNS **300** might be implemented. These include a two-team sporting event **110**, a multi-team sporting event **120**, an individual sporting event **130**, a play **140**, an opera **150**, a ballet practice **160**, a violin recital **170**, a child's piano practice **180**, a civic event **185**, a political event **190**, and a fireworks display **195**. At a baseball event, the baseball game itself can be regarded as a performance **1100**; a pre-game show might optionally be regarded as part of the same performance **1100**, or as a separate performance **1100**. Often a single performance **1100** is the focus of an event **100**—what the fans came to observe or experience. But an event **100** may include one or more performances **1100**; events **100** themselves may be hierarchical, with an event **100** including other events **100**.

A fan **200** is an individual or organization that is interested in an event **100** or in a performer or artist, such as a band or a team. We will refer to any such interested party as a fan **200**, even in contexts, such as those shown in FIG. 1 other than sporting events **100**. FIG. 2 shows various types of fans **200**, including: the audience **210**; a follower **220**; the press **230**; a referee **240**, such as a baseball umpire; a performer **250**; a coach **270**; a manager **260**; or other interested party **280**.

An event networking service (ENS) **1500** is a service, such as the exemplary ones shown in FIG. 15, provided by a FNS **300** to registered fans **200** at one or more events **100**. The FNS **300** is implemented collaboratively between a fan networking management system (FNMS) **310** and the PSDs **320** of fans **200**. FIG. 3 is a conceptual diagram illustrating communication among components of an FNS **300**. The FNMS **310** might include any kind of hardware and software appropriate for carrying out its functionality. For example, the FNMS **310** might include a server **311** and a computer **312** providing a user interface (UI) **445** for management of the FNS **300**; i.e., a management UI **450**. Examples of types of PSD **320** include a cellular phone **321**, a portable media player **322**, and a tablet computer **323** or e-reader. FNMS **310** configuration is discussed in more detail in FIG. 3; PSD **320** configuration, in FIG. 5.

Communication occurs over a communication system **330**. The communication system **330** might include a wide-area network such as the Internet, a local network, or a personal network. The communication system **330** may include any kind(s) of hardware or software, and may use any forms of communication protocol(s). A combination of communication systems **330** is itself a communication system **330**. Double-headed arrows, as typified by arrow **350**, indicate the possibility of two-way communication. Single-headed arrows, typified by arrow **351** indicate one-way communication. In particular, GPS satellites **340** transmit microwave signals that the PSD **320** receives and uses to determine its own location. Other geolocation technology might be used alternatively or in addition, such as beacons and cell phone towers. The communication system **330** connects an instance of a FNA **510** running on participating PSDs **320** with the FNMS **310**. The FNA **510** might also facilitate direct communications between PSDs **320** of fans **200**, taking advantage of, for example, BLUETOOTH® or WiFi that might be available in a PSD **320**. See, e.g., FIG. 21 and associated text.

FIG. 4 is a block diagram illustrating a FNMS **310**. Except for the FNMS software **460**, all components in the figure may include hardware. FNMS **310** provides ENSs **1500** to fans **200** through their PSDs **320**. A FNMS **310** may be remote from most or all of the PSDs **320**. FNMS **310** execute logic, including FNMS software **460**, possibly on one or more servers **311**. FNMS **310** may include a controller **410**, which includes a processor, that runs the automated portions of

FNMS **310**, and interacts with staff managing FNMS **310** through a management UI **450**.

Logic of FNMS **310** facilitates or provides interaction among PSDs **320**, as well as other networking services **1600** described herein. FNMS **310** may register fans **200**; schedule events **100**; organize games and contests; advertise; sell goods and services; provide propositions of outcomes for betting; or manage a prediction market. Ongoing human management, interacting with controller **410**, may be required as types and details of ENSs **1500** may need to respond to evolution of an event **100**. The management UI **450** allows the event **100** management to do whatever is necessary to run a FNS **300**. The FNMS **310** includes storage **430**, which may include FNMS software **460** and data accessed by the controller **410** in executing software instructions. The storage **430** might also include data received from, or to be sent to, any of the types of fans **200** shown in FIG. 2. The storage **430** might include any databases regarding any of the information described in relation to FIG. 8-23. FIG. 27 illustrates kinds of information that might be included in storage **430**. Alternatively, some or all of this data, especially data pertaining to an individual fan **200**, might reside on their PSD **320**. Information sharing among FNAs **510** of attending fans **200** will be facilitated by the FNMS **310**. FNMS **310** may include a timer **440**. A number of timing tasks and timing needs are described in connection with FIG. 11-14, some or all of which might utilize the timer **440**. FNMS **310** has a communication interface **420** to interact with the PSDs **320** of fans **200**.

Note that logic of a FNS **300**, in the form of hardware, or software instructions executing on hardware, may be divided in various ways between PSDs **320** of fans **200** and FNMS **310**. For example, some or all of the timing tasks might be carried out on the PSDs **320** rather than by timer **440** and controller **410**. Any workable division of FNS **300** logic is within the inventive scope.

FIG. 5 is a block diagram that illustrates exemplary components of a PSD **320** that might facilitate fan **200** interaction with ENSs **1500** provided by the FNS **300**. PSD **320** includes a processing system **550**, which includes a processor that executes software FNA **510**. FNA **510** might be installed on the PSD **320**, e.g., by the manufacturer or vendor of the PSD **320** or by a cellular service provider. FNA **510** might be available for download to the PSD **320** from a website such as, for example, the APP STORE®, GOOGLE PLAY®, or from a site provided by FNMS **310**. PSD **320** may include storage, which may contain software instructions of the FNA **510**, and data. The data might, for example, be data required or used by FNA **510**; or by a FNMS **310**, or it might be images, video, or other computer-readable content that fan **200** might at some point choose to upload to, or has downloaded from, FNS **300**. FNS **300** may allow fans **200** to share such content with other fans **200**. A photo might be used to customize a product, as described in reference to FIG. 18. PSD **320** has a UI **445**, which may include a graphical user interface (GUI) **530**. UI **445** allows fan **200** to take advantage of FNS **300** services and social interactions, such as those described in relation to FIG. 15-23. Text entry might be done through a touch screen or some other form of text entry system **540**, such as a keyboard; there may be other tactile controls as well included in the UI **445**. PSD **320** may have a camera **590** for taking still photographs and videos. It may have a microphone (mic) **591**, for making audio recordings. PSD **320** may have other sensors (not shown), such as a thermometer, that might provide shareable data. PSD **320** may include a geolocation system **570** (e.g., a GPS **571** receiver), allowing PSD **320** to determine its location from satellite transmissions, or other hardware or software to facilitate geolocation of PSD **320**. Interaction

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with FNS 300, including interaction with FNMS 310 (e.g., transmission of the location of PSD 320; registration of PSD 320 with one or more FNSs 300; and qualifying as attending event 100); and with other fans 200, may be accomplished through one or more wireless communication interfaces 520, such as cellular, BLUETOOTH®, or WiFi.

FIG. 6 illustrates an embodiment of a process whereby a FNMS 310 provides, and a fan 200 receives, ENSs 1500 during an event 100. After the start 600, fan 200 registers 620 their PSD 320 with FNMS 310 to participate in the FNS 300 at the event 100. FNA 510 is executing 630 on a powered-on PSD 320. For example, the FNA 510 might be configured to execute whenever the PSD 320 boots up, or the user might initiate execution of the FNA 510. The FNMS 310 initiates management 640 of event 100 and initiates ENS 1500. Using geolocation, FNA 510 tracks PSD; the tracking data is transmitted by PSD 320, and received by FNMS 310. Using the tracking data, FNMS 310 detects 640 that the fan 200 is attending the event 100. If 650 the FNMS 310 determines that fan 200 is qualified to participate in ENS 1500 at this event 100, then FNMS 310 provides 660 ongoing ENSs 1500 through PSD 320 of fan 200 during event 100. The process ends 699.

FIG. 7 illustrates that a FNMS 310 might be organized at any of a variety of levels. Some exemplary events 100 are shown in rounded rectangles. The events 100 include two baseball games, team Z playing at Y's ballpark 710 ("Z-at-Y game") and team Y at X's stadium 720 ("Y-at-X game"); a soccer match, team B at A 730 ("B-at-A match"), played at X's stadium; a concert 740 of orchestra M ("concert"); and college theater performance 750 ("play").

In FIG. 7, exemplary FNMSs 310 are shown in rectangles. A FNMS 310 might provide a FNS 300 at the level of an institution, team, or performer; for example, college FNMS 751; orchestra FNMS 742; Z-team FNMS 711; X-team FNMS 721; Y-team FNMS 713; A-team FNMS 731, and B-team FNMS 732. A FNMS 310 might provide FNS 300 at the level of a venue 800 where events 100 are held; for example, Y ballpark FNMS 712; X stadium FNMS 722; and concert hall FNMS 741. A FNMS 310 might provide a FNS 300 at the level of a league, consortium, or other group; for example, baseball league FNMS 760; soccer league FNMS 770; and fine arts consortium FNMS 780.

A line in FIG. 3, connecting an event 100 to a FNMS 310 indicates that FNMS 310 might provide ENSs 1500 at the event 100. There are several things to note. A given FNMS 310 might serve multiple individual events 100 or multiple types of events 100 (e.g., theater and soccer). A given event 100 might be served by a single FNMS 310, from any level, or by two or more FNMSs 310. These FNMSs 310 might offer ENSs 1500 to fans 200 through a common FNA 510, or independently through respective FNAs 510. A central FNMS 790 might serve multiple types of events 100, leagues, venues 800, and so forth. When multiple FNSs 300 serve a given event 100, each of them may provide different services and rewards to fans 200. For example, a central FNMS 790 might provide redeemable points for attending a variety of event 100 types, while a venue- or team-level FNMS 310 might offer services and incentives to encourage attendance at its own events 100.

A single FNA 510 executing on a user's portable electronic PSD 320 might connect with one or more FNMSs 310 for a single event 100. The FNA 510 maintains in storage 560 on the PSD 320 a list of the FNMSs 310 it is registered to access. Some of these FNMSs 310 may require a fee or fees for registration, and/or for access to ENS 1500 at particular events 100. The list of FNMSs 310 might evolve either auto-

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matically—e.g., an FNMS 310 might update the list of FNSs 300; or by user choice by, for example, by accessing a website, or through the UI of the FNA 510 itself. For any event 100 for which the PSD 320 is registered with a relevant FNMS 310, then the geolocation functionality will cause the FNA 510 to be placed into wireless communication with that FNS 300; or multiple FNSs 300. Two FNMSs 310 serving a single event 100 may offer ENSs 1500 through a single FNA 510, or independently through separate FNAs 510. In other words, FNMS 310 X may require FNA 510 A, while FNMS 310 Y requires B; or both X and Y may require A.

FIG. 8 shows venue 800 where a performance 1100 is held before an audience 210. The venue 800 of FIG. 8 is a ballpark, and the event 100 is a baseball game. A venue 800 might be, for example, a theater, a convention center, a classroom, an auditorium, a park, or any type of sports venue 800. A venue 800 may or may not include a building, such as a ballpark or concert hall. The venue 800 might be indoor, outdoor, or some combination thereof. The event 100 might be competitive, such as a football game, a debate, or a math competition; or noncompetitive, such as an orchestra concert or a musical.

As will be described in relation to FIGS. 11 and 13, the FNA 510 may use the geolocation functionality of a PSD 320 to determine a current state 1400, relative to the event 100, of a fan 200. The selection of ENSs 1500 provided to fans 200 in general, or to a particular fan 200, may depend upon such event/fan state 1400.

Taking full advantage of an FNS 300 might require extended use by the fan 200 of a FNA 510 throughout an event 100, and possibly even for some time afterward. Some steps can be taken to conserve battery 580 life in those PSDs 320 that offer both a HIRES and a LORES mode of geolocation service by reducing the level of geolocation resolution when feasible, consistent with the state 1400 of the fan 200 relative to the event 100.

FIG. 8 depicts an inner boundary (IB) 821, a middle boundary (MB) 822, and an outer boundary (OB) 823. These three boundaries 820 divide the horizontal space in the vicinity of the venue 800, a ballpark, into four layered zones 830: an inner zone (IZ) 831 or interior 831, a middle zone (MZ) 832, an outer zone 833, and an external zone 834 or exterior 834. Such zones 830 may be used in determining state 1400 of a fan 200, relative to the performance 1100, as that state 1400 evolves. The zones 830 might also be used to choose between LORES and HIRES geolocation technology, so as to extend battery 580 life.

In FIG. 8, the IB 821 is the boundary of the venue 800 itself (or something closely approximating that boundary), and the MB 822 and OB 823 are both circles. An IB 821 might, in some circumstances, be a closed figure that is entirely or partially inside the venue 800 boundary.

Admission to an event 100 often requires a fee, and even at free events 100, attendance in person is often encouraged by management. Because an FNS 300 provides valuable ENSs 1500 to attendees, IB 821 will preferably be chosen so that such services are not extended to people who are not entitled to receive them. Thus, if the venue 800 is a building, an IB 821 that closely tracks the boundary of the building may be preferable.

For some venues 800 and geolocation technologies, however, locating an IB 821 interior to a wall of a venue 800 might make detection of when a fan 200 has crossed into the IZ 831 impossible. For example, GPS tracking is unavailable in some buildings. Preferably, therefore, IB 821 will be at or beyond the boundary of the venue 800 itself, although in some embodiments, IB 821 might be a simpler shape (e.g., a circle or rectangle) than the exact boundary of a building, or MB

822 or **OB 823** might have a less regular shape. However, for any given venue **800**, a simple shape may be easier to implement, and yet be entirely adequate. Other forms of geolocation can be used instead of, or complementary to, GPS, when appropriate.

FIG. 9 shows a different venue **800** layout to illustrate generality of the zones **830** concept. The venue **800** in this example is a lake **900** over which a fireworks display will be held. The audience will observe from the IZ **831**. Both IZ **831** and MZ **832** are bounded in part by the shore of lake **900**. IZ **831** and MZ **832** are layered, but MZ **832** does not entirely surround IZ **831**. The OB **823** is a square.

Layered zones **830** can be exploited to reduce the usage of the battery **580** of the PSD **320** required for geolocation, while providing HIRE tracking when needed to facilitate an IB **821** that coincides with or closely approximates the boundary of the venue **800**. PSD **320** is a proxy for the fan **200** who has registered the PSD **320** with a FNMS **310**. Thus, if we say that a fan **200** is in some specified zone **830**, strictly speaking we mean that the FNMS **310** has detected that the PSD **320**, which is registered to the fan **200**, is within that zone **830**.

FIG. 10 is a flowchart that illustrates how zones **830** might be used to reduce battery **580** usage when GPS **571** is used for geolocation, while geographically limiting ENSs **1500** to only fans **200** who have qualified to receive them. After the start **1000**, FNMS **310** detects **1010** that fan **200** is within OZ **833**. Such detection will require that PSD **320** is powered on, and that FNA **510** is executing on PSD **320**. FNMS **310** transmits **1020** an instruction to FNA **510** to use HIRE tracking. FNA **510** demands **1030** the geolocation system **570** of PSD **320** to use HIRE tracking. The geolocation system **570** initiates **1040** HIRE tracking if it is not in that mode already. Detection that fan **200** has crossed **1050** into IZ **831**, and that fan **200** is remaining for a qualifying interval within IZ **831**, is thus done with HIRE tracking, which can be quite precise. Once fan **200** qualifies **1060** as attending event **100** (which might require a fee to the FNMS **310**, which the FNMS **310** might automatically charge against an account of the fan **200**), FNMS **310** might choose to be more tolerant of imprecision in geolocation of that fan **200**. FNMS **310** transmits **1070** an indication to PSD **320** that HIRE tracking is no longer needed. FNA **510**, in turn, indicates **1075** to FNA **510** that it no longer needs HIRE tracking. If geolocation system **570** is not using HIRE tracking for some other PSD **320** purpose, it would ordinarily turn off HIRE tracking, conserving battery **580** life. At some later time, fan **200** is detected **1080** as crossing MB **822** into OZ **833** (or alternately, OZ **833** into EZ **834**). At this point, FNMS **310** may regard **1090** the fan **200** as not present at event **100**, and consequently may modify or reduce ENSs **1500** being offered to fan **200**. The process ends **1099**.

Of course, a FNMS **310** might want to vary ENSs **1500** at detailed locations within venue **800** itself—for example, in a ballpark, FNMS **310** might offer coupons **1955** to only restaurants nearby the fan's seat—then HIRE geolocation, and hence more detailed geolocation might be required throughout event **100** within the interior of the venue **800**. Other aspects of the invention apply, regardless of whether layered zones **830** and/or switching between HIRE and LORES tracking are utilized at a given event **100** or by a given FNMS **310**.

Commonly, a performance **1100** is embedded in an event **100**. Of course, FNMS **310** has discretion in what it treats as a performance **1100**, and what it treats as an event **100** for purposes of selecting ENSs **1500**. FIG. 11 is a timeline depicting occurrences delineating a performance **1100**, an event

100, and the duration of a super-event **1110**, during which ENSs **1500** are provided for fans who qualified “attending”. The performance **1100** is embedded within the larger event **100**. The event **100** starts **1120** before the start **1150** of the performance **1100**. From the viewpoint of FNMS **310**, and usually the expectations of the audience **210** as well, event **100** might be considered to begin when doors of the venue **800** open, and end when the doors close. For example, at a ballgame, the event **100** might include some pre-game or post-game activities. The performance **1100** might be regarded as lasting from the first pitch to the final out. At an opera event **100**, coffee and cookies might be sold in the lobby before or after the performance **1100**. At a concert, recordings of the performing artists might be sold to attendees after the end **1160** of the performance **1100**, but before the end **1180** if the event **100**. In any case, it takes time for an audience **210** to leave the venue **800**.

Note that a timeline for an event **100** might be more complex than the exemplary one shown in FIG. 11. A state fair, for example, might run for several days. The state fair overall might be regarded as an event **100**; each day might be regarded as a separate event; and each performance, display, amusement ride, or game within the fair on a given day might be regarded as a separate event **100**. Similarly, a college football game might be preceded by a tailgating event surrounding the stadium, or at an adjacent location. The super-event **1110** might be regarded by the FNMS **310** as the combination of the tailgating and the game, each of which is treated as a separate event **100**. Alternatively, the FNMS **310** might choose to regard the game as the only event **100**, but change the boundaries **820** of zones **830** during the super-event **1110**. The principles and methods of the invention extend to such situations, perhaps with a central FNMS **310** (e.g., the manager of the whole state fair) and other FNMSs **310** at the various subsidiary levels each determining whether to take advantage of a FNS **300** for their level of event **100**. The Olympic Games are another example of a complex, hierarchical event. See FIG. 7. Preferably, in such situations all applicable ENSs **1500** will be offered to fans **200** through a single FNA **510**. The selection of ENSs **1500** provided by the FNMS **310** may vary with factors including timing and location of performances, facilities such as stores and restaurants, and with the state **1400** of fans **200** relative to those factors.

As will be described in relation to FIGS. 14 and 15 the FNMS **310** may provide more or better ENSs **1500** to fans **200** who are detected to be actually attending the event **100**. However, a FNS **300** might offer a limited selection of ENSs **1500** to some fans **200** who are not in attendance; e.g., fans **200** of a baseball team watching a game on television. We will refer to the level and variety of ENSs **1500** available to fans **200** during the event **100** itself as “full service”. Note that “full service” does not imply that such fans **200** will receive an identical or a complete set of ENSs **1500**. Based on location of the PSD **320**, a process of qualifying, described in relation to FIG. 12, can be applied to make this determination of attendance. An effect of qualification for an exemplary scenario of possible state **1400** relative to an event **100**, which includes a performance **1100**, is shown in FIG. 11. Immediately upon arrival of the fan **200** inside the venue **800** after the start of the event **100**, full service through the FNA **510** to the fan **200** begins. We will refer to the time interval when full service is available to fans **200** who qualified as attending as the super-event **1110**. Assuming that the fan **200** does qualify **1140**, full service may continue until, depending upon embodiment, either the performance **1100** ends **1160**, the fan **200** leaves **1170** the venue **800**, or the event **100** ends **1180**. The preferred approach, however, is shown in the figure—

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FNMS 310 will provide full service for a super-event 1110 which extends for some interval after the event 100 ends 1180. For example, full service for an afternoon baseball game might continue to be provided to fan 200 after the ballpark has closed for the day to the public, and after fan 200 has gone home. The length of the post-performance extension may depend upon the type of performance. An extension having any duration of 30 minutes to 6 hours might be appropriate for a baseball game.

In order to conserve battery 580 life, preferably, HIRE tracking will not be required until an inbound fan 200 crosses the OB 823 into the OZ 833. When the fan 200 crosses the OB 823 (or in some embodiments, the MB 822) in the other direction, then the HIRE requirement can be turned off. This might happen, for example, if a fan 200 enters the OZ 833, and then exits into the EZ 834 without entering the IZ 831.

A relatively large number of people who are registered as fans 200 with the FNMS 310 may enter the IZ 831 after the start 1120 of the event 100, but not remain for the performance 1100. Such a fan 200 might, for example, stop to buy a ticket for an upcoming event 100, or to drop off their child, or to make a delivery. To distinguish an attendee from a fan 200 who is, as it were, “just visiting”, we want to know when someone leaves the venue 800 once the FNMS 310 demand for HIRE tracking has been removed. This can be done more or less satisfactorily by using LORES tracking to determine that the fan 200 has exited the MZ 832 into the OZ 833 by crossing the MB 822 (or, in some embodiments, OZ 833 into EZ 834 by crossing the OB 823).

As already mentioned, not everyone who is near, or temporarily inside, the venue 800 is necessarily attending the performance 1100. FIG. 12 is a flowchart that illustrates an exemplary process of qualifying a fan 200 to be considered as “attending” a performance 1100. The approach of FIG. 12 is to regard a fan 200 as attending if they enter the venue 800, and remain inside for some qualification time interval DT, for example, 10 min. At the start 1200 of the process, it is assumed that super-event 1110 has already begun 1202. If 1205 the fan 200 has already qualified, then the qualification steps can be skipped. Once the fan 200 enters 1210 the IZ 831, the FNMS 310 causes 1220 a timer 440 to be started; the timer 440 might be within the PSD 320, or within the FNMS 310. If 1230 the fan 200 leaves the MZ 832, as detected by step 1240, before interval DT has expired, then the timer 440 is stopped 1290, and full service ends 1280. The fan 200 has failed to qualify. Otherwise, if 1240 the fan 200 remains through interval DT, then the timer 440 is stopped 1250, and the fan 200 qualifies 1260 as attending the performance 1100. So long as super-event 1414 has not ended (see the loop at step 1270), the fan 200 continues to attend. Once the super-event 1414 period ends, full services end 1280. The process ends 1299. In some embodiment, additional steps might be required for qualification, such as paying a fee to the FNMS 310 through the FNA 510.

Note that some ENSs 1500 might be available to a registered fan 200 prior to qualification. For example, a fan 200 entering the vicinity of a ballpark might receive a banner photo and legend, e.g., “Welcome to Thunderbold Field”, through their PSD 320.

FIG. 13 is a table 1300 that illustrates possible effects of timing and location of the PSD 320 upon monitoring level 1350 and state 1400 of the fan 200. Columns in the table 1300 fall into two categories, timing 1310 and device location 1320. The timing 1310 category includes columns that specify whether it is during the event 1311 and whether the fan 200 is qualified 1312 as attending. The device location 1320 category includes columns that specify whether the fan

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200 is inside the OB 1321, inside the MB 1322, or inside the IS 1323. Rows in the table specify monitoring level 1350 (either no monitoring 1331, LORES monitoring 1332, or HIRE monitoring 1333), and whether the fan 200 is in the process of qualifying 1334, and whether they are regarded as actually present 1335. The state 1400 of being present 1335 might affect the types and level of services offered to them by the FNMS 310. Each cell in the table contains either the word “YES”, as typified by the cell labeled 1341; “NO”, as typified by the cell labeled 1342; or is empty, as typified by the cell labeled 1343. The header for a row represents an exemplary consequence of the Boolean statement formed by the column headers in combination with the contents of cells in that row. Empty cells are irrelevant. The resulting Boolean statements imply the following. When not during an event 100, no monitoring of fan 200 location is occurring. Otherwise, during an event 100, once a fan 200 has qualified as attending, LORES monitoring of the location of that fan 200 is done. When a fan 200 is inside the OB 823 and has not qualified as attending, then HIRE tracking of the fan 200 is done. This reduced monitoring level 1350 is particular implementation of a battery 580-conserving strategy. Once a fan is inside the IB 821, but has not qualified as attending, then the fan is in the process of qualifying. Once a fan 200 is qualified, and is within the IB 821, then the fan 200 is regarded as present 1335.

FIG. 14 is a conceptual diagram that illustrates exemplary factors which might be used in some embodiments to determine a current state 1400 of a fan 200, in order to select types and levels of functionality offered to a fan 200 by the FNMS 310 through the FNA 510 on their PSD 320. In the baseball scenario, a coupon 1955 for a restaurant in the ballpark is appropriate during the performance 1412 for a fan 200 who is attending and present 1431. However, it would be inappropriate to offer that same fan 200 a free pom-pom in the home team's colors if the fan 200 chooses to affiliate with the away 1422 team. FIG. 14 uses three factors to determine state: timing 1310, attendance 1430, and team affiliation 1420. Depending upon embodiment, not all of these factors might be used in determining state 1400. For example, team affiliation is irrelevant for an orchestra concert. Other factors might be used in addition to those shown. For example, state 1400, which may be used to determine levels (e.g., value of a coupon 1955; probability of receiving a free gift) and types of services (see FIG. 15), might also be based upon fan 200 type, as illustrated by FIG. 2; or by “friends” relationships, as illustrated by FIG. 20.

The cells 1405 in FIG. 14, which correspond to states 1400 of fans 200 relative to an event 100, are shown empty for graphical convenience. However, for respective embodiments, each cell 1405 may correspond to a set of choices, made by FNMS 310, from among the kinds of exemplary ENSs 1500 shown in FIG. 15 and FIG. 16. For example, full service to a member of the audience 210 at a performance 1100 might include messaging 1510 among fans 200 and/or among “friends”; the ability to interact with, and possibly create, social groups of other fans 200 interested in the performance 1100; loyalty recognition 1550 for a fan 200 who may regularly attend performances 1100 of a certain type (e.g., games of a baseball team); and the opportunity to participate in contests. A given cell might correspond to any combination of services, from none at all, to full service (i.e., an enhanced set of services available to a fan 200 during the event 100 or thereafter). (Note that even at “full service”, some variations in services offered to fans 200 may vary depending upon their spatial positions within the venue 800, or upon other factors.)

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The state **1400** of a fan **200** relative to an event **100** can evolve over time. The timing **1310** factor of FIG. **14** is determined by how FNMS **310** chooses to run the event **100** including, for example, when they open and close doors of a venue **800** where the performance **1100** is held. The FNS **300** must know time points relevant to its operation. A time point might be manually entered to FNMS **310** through management UI **450** (e.g., we have just opened the doors); might be available to the FNMS **310** from a database in storage **430**, possibly in a schedule or agenda previously entered through the management UI **450** (e.g., the performance **1100** will begin at 8 PM tomorrow); or obtained from one or more sensors (e.g., a sensor that detects that all the seats in an auditorium are now filled). In embodiments represented by FIG. **14**, the timing **1310** factor can take on values of: within the event **100** but pre-performance **1411**; during the performance **1412**; within the event **100** but post-performance **1413**; in the super-event **1414** (but outside the event **100**), and other time **1415**.

The attendance **1430** factor in FIG. **14** may be determined by logic and geographical tracking as described, for example, in relation to FIGS. **8**, **12**, and **13**. In embodiments represented by FIG. **14**, the attendance **1430** factor can take on values of attending and present **1431**, attended and not present **1432**, and not attending **1433**. Note that one might have been attending and present **1431**, even though the current time is, for example, post-performance **1413**.

The affiliation **1420** factor in FIG. **14** might be entered by the fan **200** through the FNA **510**. The affiliation **1420** might be set to a default value during registration of the fan **200** with the FNMS **310**, or upon acquiring the FNA **510**. The fan **200**, again through the FNA **510**, may be able to update the default, or override it temporarily for a particular performance **1100**. In embodiments represented by FIG. **14**, the affiliation **1420** factor can take on values of home **1421**, away **1422**, and neither **1423**.

Note too that other factors not shown in FIG. **14** may also contribute to determining state of an event **100** and a fan **200**, and hence the types and levels of functionality offered to fans **200** by the FNS **300** through the FNA **510**. For example, a given Olympic Games includes many events **100**, venues **800**, organizations, and levels of management; and might well have many FNMSs **310**. FIG. **11-14** are illustrative of fan state for more commonplace embodiments of the invention. The technologies discussed herein—e.g., FNA **510** on PSD **320**; geolocation; battery optimization; rules defining event **100** state and fan **200** state relative to an event **100**; fan **200** choice of interests or affiliation; and ENSs **1500** that depend upon event **100** state, fan **200** state, and fan **200** choices—can be applied in more complex situations.

FIG. **15** describes categories of ENSs **1500** that might be provided to fans **200** by a FNS **300**, mostly through their PSD **320**. The categories include messaging **1510**, social networking **1520**, occasion recognition **1530**, memorabilia **1540**, loyalty recognition **1550**, contests and games **1560**, and wagers **1570**. For example, the FNS **300** might recognize a fan **200** for regular attendance at events **100** as an instance of loyalty recognition **1550**. Through the FNS **300**, a ballpark might post a birthday announcement on the scoreboard, possibly for a fee, as part of occasion recognition **1530**. Any given service in any given category might be limited to fans **200** falling within a specific set of states **1400** from among all available states **1400**, such as those depicted in FIG. **14**.

FIG. **16** is a conceptual diagram that illustrates exemplary services that might be provided by a FNS **300** relating to social networking **1520**. (Some of these services also fit other categories shown in FIG. **15**. Social networking **1520** is pro-

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vided to the fan **200** through their PSD **320**. Exemplary services might allow a fan **200**: (1) To join **1610** with a group of other fans **200**, or create a new group. (2) To network **1612** with “friends” who are also attending an event; (3) To choose **1615** whether they want to affiliate with the home or the away team, in the context of a two-team sporting event. (4) To send and receive **1620** text or other messages. Such messages might be exchanged with other group members, or with any of the types of fans **200** shown in FIG. **2**. Preferably, to participate, a fan **200** will not have to identify the particular venue **800** or the event **100** they are attending with a hashtag. (5) To receive **1625** data (e.g., game statistics) about the performance **1100** or related performances **1100**. (6) To post **1630** photos, videos, and other digital content to groups and another fans **200**. (7) To participate **1635** in contests and games **1560**, such as that described in relation to FIGS. **22** and **23**. Such contests and games **1560** may be provided by the FNMS **310** through the FNA **510** to fans **200**. (8) To earn and redeem **1637** valuable points **2699**. (9) To wager **1638** such points **2699** among friends, social groups, or the fans **200** of the event **100** generally. (10) To participate **1639** in prediction markets, preferably using points **2699**. (11) To be notified **1640** about upcoming and related events. (12) To receive **1645** historical information (e.g., season statistics) related to the performance **1100**. (13) To receive **1650** advertising. (14) To buy **1655** merchandise. (15) To communicate **1660** with celebrities (e.g., performers). (16) to receive **1665** recognition for loyalty (e.g., receive a memento for attending a specified number of home games during a season). (17) to participate, using their PSD **320**, in surveys or polls, conducted by event **100** management through the FNMS **310**.

A posting might be directed by the FNMS **310** to a scoreboard or other similar display, possibly upon request of a fan **200**. The FNMS **310** might also transmit to a fan **200**, and the fan **200** might receive video or AN relating to the event **100** or venue **800**, such as instant replay video.

Conventional messaging systems require a sender to specify one or more addresses to which a message is to be sent, such as an e-mail address or text number (each considered a separate “Address”). For some social networks, one or more recipients (“followers”) can pre-select a particular sender’s Address and receive all messages from such sender. The sender would also identify the message through the use of a keyword(s) by using a hashtag (#) (an “Identifying Subject”) and all senders’ messages with the same Identifying Subject would be posted together in a message stream. Identifying Subjects are specific to a hashtag. For example, recipients viewing a message stream entitled #Yankeesbaseball will see different posts than #NY Yankeesbaseball or #Yanksbaseball, and the viewers of these three message streams will not be “connected together”—even if are all attending the same Yankees baseball game. In conventional messaging, the Address or Identifying Subject is the link between a sender(s) message and recipient(s) who receive or view a message(s).

Because a FNS **300** is aware of the respective and evolving states **1400** of fans **200** relative to an event **100**, messaging and other forms of sharing through the FNA **510** can eliminate such address multiplicity through event-based messaging. For example, all groups associated with a ballgame and available to fans **200** who are actually present might be displayed in a menu through the FNA **510**. Because this list of groups can contain groups exclusively associated with this event **100**, it would be far easier to navigate, and to find relevant information in, than more conventional SNAs external to the event **100** or the super-event **1110**. The list of groups available to fans **200** who are not present might be different from those who are attending.

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Event-based messaging (EBM) does not require an Address or Identifying Subject. Rather with EBM, messages posted by any fan **200** can be streamed to all other qualified fans **200** at the same event **100**, and only to such qualified fans **200**. The venue **800** and the event **100** becomes the link between the sender and receiver of a message rather than an Address or Identifying Subject and all qualified fans can be connected together in the same message stream without having to know the Address of other fans at the event, or be subject to the vagaries of slight differences in the Identifying Subject (such as those for the Yankees above) that prevent such connection. Team-based and venue-based messaging offer advantages similar to EBM.

FIG. 17 shows examples of opportunities, provided by a FNS **300** to fans attending an event, for EBM, team-based messaging, and venue-based messaging, games, contests, and wagering. Three windows, which might be displayed to a fan **200** at a baseball game through the GUI **530** on their PSD **320**. The windows might be displayed simultaneously on the GUI **530**, or separately. Entries are underlined to suggest that they are links. If the user selects a link, more information about that entry might pop up on the GUI **530**. The organization of entries in these windows is not particularly realistic, but hopefully they will make more concrete some of the concepts presented so far. The top window **1700** is dedicated to entries relating to a particular team, which might correspond to the FNMS **310** of this FNS **300**; the middle window **1710**, to the event **100**, today's game; the lower window **1720**, to the venue **800**. No hashtag or other identifier is required to participate in messaging **1510** and other ENSs **1500** for the team, the game, or the ballpark; such identification is inherent in attendance by a registered and qualified fan **200** at this event.

Several of the links shown in FIG. 17 give the fan **200** the opportunity to participate in a discussion group, possibly in response to a news item; these include: Link **1701**; Link **1702**; Link **1703**; Link **1712**; Link **1716**; Link **1721**; Link **1722**; and Link **1723**. Link **1717** is a link to another window, allowing the fan **200** to initiate their own discussion group. Link **1704** is link to a sales offer, which might offer the user points **2699**. Link **1711** and Link **1713** are contests **2680**, which might also offer points **2699** to the winner(s). Link **1718** is a link to a list of the "friends" of this fan **200** currently attending (or alternatively, somehow participation, possibly from home) the game. Link **1719** is an offer for a wager from friend Bob (see, e.g., FIG. 24). Link **1715** is a link to an opportunity to play a contest, such as that described in FIG. 22. Note that the content and arrangement of the GUI **530** may, and probably will, change during the course of a super-event **1110**, event **100**, or performance **1100**.

Through the FNA **510**, the FNMS **310** may offer custom products **1800**, customized in various ways, such as those shown in FIG. 18. A custom product **1800** might depict or represent something specific **1810** to the performance **1100**, such as a logo or other representation of the two competing teams in a ballgame, and a date. A custom product **1800** might depict or represent something specific **1840** to a team (e.g., home or away), that the fan **200** has chosen to affiliate with. A product might depict or represent something specific **1850**. A product might depict or represent something specific **1830** to some occurrence during the performance **1100**, like the winning team, or a record that was set during the performance **1100**, or a photo of a soloist. Possibly the most interesting kind of customization would be fan-specific **1820**. For example, a fan **200** might upload a picture of a family member or a "selfie" (self-photograph), taken at the performance **1100**. The picture might be combined with one of the other kinds of customization, and included, for example, in a

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framed photo, on a t-shirt, or on a coffee mug. Depending on its type, a custom product **1800** might be delivered by shipping; picked up at a store in the venue **800**; or if digital, downloaded through the FNA **510**.

FIG. 19 is a conceptual diagram that illustrates types of memento **1900** products that might be offered to, and in some cases customized by, fans **200** through a FNS **300**. Such mementos **1900** may include clothing **1905**; a certificate **1910**, such as proof of attendance; a ticket **1915** to another performance **1100**; a lottery ticket **1920**; media **1925**, such as a recording or video; a toy **1930**, such as a bobble-head doll; an entry **1935** for a contest conducted by the FNS **300** and run through the FNA **510** during the event **100**; some kind of contact with a celeb **1940**, perhaps a signature or a face-to-face meeting; food; a broadcast **1950** opportunity, such as the right to post a child's birthday on a display in the venue **800**; a coupon **1955**, which might be redeemed at a store in the venue **800**; or an item of equipment **1960** from the performance **1100**, such as a game ball or an actor's ruby slippers. Any such memento **1900** might be awarded to a winner of a contest.

FIG. 20 is a flowchart that illustrates how social networking "friends" might be identified by, and interact through, a FNS **300**. Various SNSs allow people to designate other people as "friends" (e.g., FACEBOOK®); "followers" (e.g., TWITTER®); "contacts" (e.g., LINKEDIN®); "circles"; "groups"; or other terms indicating a voluntary social, professional, or business relationship between or among individuals. We will use the term "Friend", with an upper case 'F', generically for such relationships. Note that an FNS **300**, at any level (see FIG. 3) may maintain its own list(s) of Friends, possibly allowing people to establish such relationships through their FNA **510**.

As defined in Wikipedia, "Friending is the act of adding someone to a list of Friends on a social networking service." If Friending occurs through the FNA **510** and the SNS is the FNS **300** itself, then the FNS **300** will know if two Friends are present at an event **100** and, depending on the granularity of the geolocation approach(es) being used, may even know where they are sitting. The FNMS **310**, maintains its own list of identifiers (IDs) of fans **200** in storage **430**.

However, if Friending occurred through an external SNS such as FACEBOOK®, then FNS **300** might be able to access the Friends list of the fan **200** on that other SNS. This may require that the fan **200** give permission for such access; that the permission be communicated to the other SNS; and that somehow the FNS **300** must be able to match the ID of the fan **200** in the FNS **300** with their ID in the SNS. Presumably, their ID in the SNS can be provided to the FNS **300** through the UI of the FNA **510** when the fan **200** gives the FNS **300** permission to access the SNS. Access by the FNS **300** to the Friends list of the other SNS will ordinarily be done through a contractual relationship between the FNMS **310** and management of the SNS. In some embodiments, a fan **200** may be able to log into the SNS using their PSD **320**, and then through the SNS itself log into the FNS **300**. When this approach is implemented, permission, communication of permission, and ID matching might all be able to be accomplished with a single click.

At a single event **100**, a fan may have multiple relevant lists of Friends contacts. If FNS **300** has access to a list of someone's Friends, then the geolocation services, in conjunction with the FNS **300** and the FNAs **510** of the Friends, can detect pairs of Friends who are attending the event **100**. Social networking Friendship is quasi-contractual, and hence although a Friendship relationship is usually reflexive (if A is a Friend of B, then B is a Friend of A), Friends do not

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necessarily form groups. For example, A may have Friends B and C, while B has Friends A and D.

At the **2000** of FIG. 20, a fan **200** is detected **2010** by the FNMS **310**, in collaboration with the FNA **510** and the geolocation system **570** of their PSD **320**, as entering the venue **800**—See FIG. 6-14 for exemplary details. If **2015** Friends networking is not active and enabled by the FNS **300**, then the process ends **2099**. If Friends networking is active and enabled by the FNS **300**, then a check may be made whether Friends networking is active through the FNA **510** on the fan's PSD **320**; the FNS **300** might (or might not) give the fan control over whether the Friends networking feature is enabled. If **2020** Friends networking is not active on the PSD **320**, the process ends. Otherwise, the FNS **300** (or the FNA **510**, depending on access means), accesses **2030** the list(s) of Friends. Note that there may be more than one list of Friends if the fan **200** participates in more than one networking group that is enabled by both the FNS **300** and the FNA **510**. If **2040** Friends on such Friends lists are present in the venue **800**, then Friends networking of the fan with those Friends will be established **2050**. Friends networking might include notification to both Friends in a pair of the presence of the other; the ability of mutual Friends to form a group, or to together or individually engage in any of the activities described in FIG. 16. Rewards might be awarded to groups, such as points **2699**, or credit toward superfan recognition.

FIG. 21 is a flowchart illustrating sharing of digital content among fans using mesh networking. Such digital content might include, for example, digital images, AN tracks, and documents. A fan **200** might want to request to download such digital content through the UI **445** of the FNA **510** on their PSD **320**. Ordinarily, the request for the digital content would be transmitted by the FNA **510** to a server of the FNS **300**, and the server would, if possible, either download the content from its own storage, or first upload the content from the PSD **320** of another fan **200**. Mesh networking uses, when feasible, direct fan-to-fan communication, and may be able to eliminate the server from uploading and downloading the content, thereby reducing load upon the server and the FNMS **310**, and possibly reducing transfer times. After the start **2100** in FIG. 21, the fan **200** becomes aware that certain digital content exists through the FNA **510**. This will involve the FNA **510** receiving **2110** metadata about the digital content and a link identifying the content. This information may have been received from the FNMS **310** or from another fan **200**. The fan **200** then requests **2120** the digital content through the FNA **510**. The FNA **510** polls **2130** the fans **200** participating in the FNS **300** via the mesh network; mesh network access might be, for example, by BLUETOOTH® or by WiFi. If **2140** the content is available from a nearby fan **200** through the mesh network, the FNA **510** requests **2150** the content, and if **2160** the transfer to the PSD **320** of the fan is successful, the process ends **2199**. Otherwise, the FNA **510** requests and receives **2170** the content from the server.

FIG. 22 is an exemplary contest that might be run through a FNS **300**. Preferably, all actions required by the fan **200** to participate in the contest will be available through a UI **445** of the PSD **320**. In our example, the performance **1100** is a sporting event, but the concept might be used in any context in which unrehearsed or random happenings happen during the performance **1100**. The contest is played on a game board **2200** similar to Bingo, and has similar rules regarding winning. In this contest, however, the fan **200** may have some control over game board **2200** contents and arrangement. FIG. 23 is a flowchart illustrating an exemplary embodiment of contest rules. The fan **200** receives **2310** a list of players and their jersey numbers, displayed on their PSD **320**. The fan

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selects **2320** from the jersey numbers. In some embodiments, the FNS **300** fully randomizes the choices of players. The fan **200** may be required to select a certain number of players from each team; for example, 7 home team players and 2 away team players. Once they pick their players, in some embodiments the fan **200** gets to arrange **2330** them on the board; in others, the arrangement may be randomized. The game board **2200** of FIG. 22 shows such an arrangement of home team and visiting team jersey numbers. For example, square **2210** contains home player number 42, and square **2220** contains visiting player number 5. The player is allowed to cover **2340** a square upon a specific type of happening during the contest; for example, a home team player gets a hit; the home team pitcher strikes out an opposing batter; or a visiting team player is struck out. The fan **200** wins **2350** if they fill N squares adjacent in a row, column, or diagonal of the grid, where N is the grid dimension. The particular board shown is a 3×3 grid. Bingo is traditionally played on a 5×5 grid. The actual dimension of the square grid may be chosen by the managers of the event **100**, depending upon the number of fans **200**, the values of the prizes, and the target number of winners.

It should be noted that contests and games are slightly different. Fans compete with each other in a game but not in a contest. FIGS. 22 and 23 describe a bingo-like contest. As an example of a game, fans **200** who are present at an event **100** might be requested to submit a photo, taken at the event **100**, by a certain time. Through the FNA **510**, all or some subset of fans **200** might be asked to pick a favorite from among the submitted photos. The remaining set of candidate photos could be narrowed iteratively by additional fan polls through the FNA **510**, until a “fan photo of the event” emerges. The winner might receive a memento, reward, prize, points **2699**, or other recognition.

FIG. 24 is a flowchart illustrating a process for betting between fans participating in a FNS **300** during an event **100**. Betting might be facilitated by a FNS **300**, in cooperation with the FNAs **510** and PSDs **320** of fans **200**, during the performance **1100**, the event **100**, the super-event **1110**, or some other interval. A wager may be based on a proposed future outcome, a “bet proposition” (e.g., a particular player getting at least one hit) either occurring or not. A given bet proposition might be made available by the FNMS **310** for a wager that might be offered by a fan **200** to a Friend or set of Friends; with another fan **200**; with a social group within the FNS **300**; or with any other subset of FNS **300** members, such as fans **200** attending the event **100**. Note, as discussed in connection with FIG. 3, that more than one FNS **300** might be available to a given fan **200** for betting during an event **100**. After the **2400** start of FIG. 24, the FNS **300** presents **2410** a list that includes bet propositions **2500** choices to some subset of the set of fans **200**. A given bet proposition **2500** might be customizable, or not. FIG. 25 illustrates a list of customizable bet propositions **2500** for a baseball game, from which a fan might choose as the basis for a bet. Entries in the list might be chosen by management of the FNS **300**, and might evolve during the event **100**. An entry might be entered into the FNS **300** through a management UI **450** to a central FNMS **310**, such as that illustrated by FIG. 7. Customization opportunities, timing for appearance, and the fan base who will receive the bet propositions **2500** may all be chosen by FNS **300** management. FIG. 25 shows five bet propositions **2500**, of which one is not customizable; one has two blanks for customization; and the remainder have one blank. If **2440** the fan **200** chooses a bet proposition **2500** from the list available through the GUI **530** of the FNA **510** then the fan **200** may, if appropriate to the given bet proposition **2500**, customize

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2450 the bet proposition 2500. Through the GUI 530, the fan 200 may choose 2460 a number of points 2699 (see FIG. 26) to bet; the FNA 510 might also allow (not shown) the fan 200 to set odds. The fan 200 offers 2470 the bet to other fans 200. One or more other fans 200 accept 2475 the bet. At some point, the bet proposition 2500 is proved 2480 to be either true or false, and points 2699 are redistributed 2490 among the betting fans 200 accordingly by the FNMS 310. The FNMS 310 through the FNS 300 may update 2430 the list during the interval of betting. The process may continue until that interval ends.

The FNS 300 might implement other forms of betting or trading among sets of fans 200 detected by geolocation in connection with an event 100, such as described in connection with FIG. 8-15. For example, fans 200 might be able, through the FNA 510 on their PSD 320, to trade, through one or more prediction markets, in futures of outcomes, as selected by the FNS 300 management.

FIG. 26 illustrates possible elements of a loyalty program 2600, whereby a fan might earn points 2699 to be redeemed for, e.g., goods, services, cash, or recognition. A fan 200 might earn points 2699 for attendance 1430 at events. For example, a bonus might be awarded to a fan 200 that attends a certain number of games in a season. A fan 200 might earn points 2699 for postings 2620 to social networks implemented by the FNS 300. Other fans 200 might be given the opportunity to react to a posting 2620 by indicating a ranking, or a LIKE/DISLIKE indication. For example, the FNS 300 might invite fans 200 to post their best “baby fan” video. The fan 200 who posted the video that received the highest rating from other fans might receive a certain number of points 2699. As another example, a fan 200 might accumulate points 2699 from ratings of their posts 2620 throughout a season. At a point near the end of the season, the fan 200 with the most points 2699 from ratings might receive a bonus of points 2699 from the FNMS 310. A fan 200 might be given a start-up bonus 2630 for joining the FNS 300. A fan 200 might gain or lose points 2699 by betting, as illustrated by FIG. 24 and FIG. 25; or by participating in some form of points 2699 trading in outcome futures, such as prediction markets 2650. A fan 200 might acquire points 2699 by purchases 2660 of goods or services made through the FNS 300 or through the FNA 510; or through participation in games 2670 or contests 2680.

FIG. 27 illustrates kinds of FNMS data 2700 that might be included by a FNMS in storage 430. Databases might include registered fans data 2710; venues data 2720; events data 2730; and current event/venue data 2740. The organization shown here is merely exemplary.

Note that the concepts of the invention extend to embodiments in which there is an event 100, but no performance 1100 as such. For example, a day at an amusement park might be treated as an event 100. Also, some points may use a different system of boundaries or layers, or different tracking method. In such embodiments, some details of the timeline and possible states 1400 will differ from FIGS. 11 and 14, respectively, but the inventive concepts of fan geolocation and fan/event states still apply.

Of course, many variations of the above method are possible within the scope of the invention. The present invention is, therefore, not limited to all the above details, as modifications and variations may be made without departing from the intent or scope of the invention. Consequently, the invention should be limited only by the following claims and equivalent constructions.

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What is claimed is:

1. A system, comprising:

- a) a portable smart device (PSD), which includes
 - (i) a processing system, which includes a processor,
 - (ii) at least one wireless communication system, implemented at least partially in hardware, through which the processing system can communicate externally, and
 - (iii) computer-accessible tangible storage, including data and software instructions used by the processing system,
 - (iv) a user interface (UI) that includes a hardware display, and
 - (v) a geolocation system that tracks geolocations of the PSD; and
- b) a fan software application (FSA), which is saved in the storage and is executed by the processing system, that
 - (i) transmits a sequence of the geolocations through a first of the wireless communication systems, directed to a first fan network management system (FNMS),
 - (ii) based upon the sequence of transmitted geolocations, qualifies the PSD as attending a first event,
 - (iii) receives a communication, from the first FNMS over one of the wireless communication systems, metadata that describes an item of digital content,
 - (iv) receives through the UI a user communication that directs the FSA to obtain the item,
 - (v) makes a determination by polling whether some second PSD, which has qualified with the first FNMS as attending the first event, contains the item and is accessible directly by one of the wireless communication systems of the first PSD, and
 - (vi) requests and obtains the item directly from such a second PSD if possible based on the determination, and otherwise requests and obtains the item from the first FNMS.

2. The system of claim 1, wherein the FSA further

- (vii) receives, through the first wireless communication system, a registration acknowledgement from the first FNMS for the PSD to receive event networking services at events where the first FNMS provides them.

3. The system of claim 2, wherein the FSA further

- (viii) receives, through the UI, registration data, and
- (ix) transmits the registration data through the first wireless communication system, directed to the first FNMS, and
- (x) receives the registration acknowledgement in response to transmitting the registration data.

4. The system of claim 1, wherein the FSA further

- (vii) through the UI, receives digital content and a fan selection to receive the digital content, the FSA limiting recipients to fans identified with PSDs that have qualified to receive event networking services from the first FNMS at the first event.

5. The system of claim 1, wherein the FSA further

- (vii) receives through the wireless communication interface address information of fans identified with PSDs that have qualified to receive event networking services from the first FNMS at the first event.

6. The system of claim 1, wherein the FSA further

- (vii) tracks geolocations of the PSD as it moves, and transmits such geolocations through the wireless communication interface, directed to a second FNMS,
- (viii) qualifies the PSD as a first fan device to receive event networking services from the second FNMS at a second event, in a second venue, by satisfying geolocation and time constraints associated with the second venue and the second event, and

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(ix) receives event networking services through the wireless communication interface from the second FNMS during the second event while in the second venue.

7. The system of claim 1, wherein the FSA further

(vii) qualifies the PSD as a first fan device to receive event networking services from the first FNMS at a second event, in the first venue, by satisfying geolocation and time constraints associated with the first venue and the second event, and

(viii) receives event networking services through the wireless communication interface from the first FNMS during the second event while in the first venue.

8. The system of claim 1, wherein the FSA further

(vii) qualifies the PSD as a first fan device to receive event networking services from the first FNMS at a second event, in a second venue, by satisfying geolocation and time constraints associated with the second venue and the second event, and

(viii) receives ENSs through the wireless communication interface from the first FNMS during the second event while in the second venue.

9. The system of claim 1, wherein the FSA uses GPS technology to track geolocations of the PSD.

10. The system of claim 1, wherein the FSA uses beacon technology to track geolocations of the PSD.

11. The system of claim 1, wherein the FSA switches between GPS technology and beacon technology to track geolocations of the PSD, depending upon geolocation of the PSD as the PSD moves, relative to the first venue.

12. The system of claim 1, wherein the first event has an event period, including a starting date and time and an ending date and time, the event period defined by the first FNMS.

13. The system of claim 12, the constraints for participating include a requirement that the PSD be continuously geolocated for a specified period of time within a bounded geographical area that includes at least a portion of the first venue.

14. The system of claim 13, wherein the specified period of time is within the event period.

15. The system of claim 1, wherein the FSA receives event networking services from the first FNMS during a super-event period, which includes and extends the event period.

16. The system of claim 13, wherein the specified period of time to qualify must occur between a starting time and an ending time specified by the first FNMS.

17. The system of claim 1, wherein the event networking services include exchanging computer-readable content with other fan devices at the first event.

18. The system of claim 1, wherein the computer-readable content is a text message, an image, a video segment, or an audio segment.

19. The system of claim 1, wherein the event networking services allow the first fan device to create, through the FNMS, a new social group associated with fan devices attending the event.

20. The system of claim 1, wherein the event networking services allow the first fan device, through the FNMS, to exchange computer-readable content with fan devices associated with existing social groups and attending the event.

21. The system of claim 1, wherein the event networking services allow the first fan device to identify and text message through the FNMS with fan devices of social networking Friends corresponding to the first fan device and receiving event networking services from the first FNMS during the first event.

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22. The system of claim 21, wherein the FSA receives a list of social networking Friends through the wireless communication interface from the FNMS.

23. The system of claim 21, wherein the list includes a Friend that was identified to the FNMS from a social network that is not managed by the FNMS.

24. The system of claim 21, wherein upon selection through the user interface of an entry from the list and specification through the user interface of digital content, the FSA transmits the digital content through the wireless communication interface, directed to a PSD corresponding to the selected entry.

25. The system of claim 1, wherein the FSA further

(vii) upon receipt of a request or demand from the FNS, changes how it tracks geolocations of the PSD.

26. The system of claim 25, wherein the request or demand from the FNS causes the FSA to change to a coarser or to a finer resolution tracking method.

27. The system of claim 26, wherein the PSD further includes

(vi) a rechargeable battery, whose rate of electricity consumption depends upon whether the tracking method uses the coarser or the finer resolution.

28. The system of claim 26, wherein the request or demand from the FNS occurs when the tracking determines that the PSD has moved to inside the outer boundary but outside the inner boundary.

29. The system of claim 1, wherein the FSA further

(vii) offers an event networking service to a plurality of PSDs that have qualified as attending the first event, in a first venue, which is not offered to a plurality of PSDs that have not so qualified,

(viii) receives event networking services through the first wireless communication system from the first FNMS during the first event while in the first venue,

(ix) tracks geolocations of the PSD as it moves, and transmits such geolocations through the wireless communication interface, directed to a first fan network management system (FNMS), wherein the tracking determines

(A) whether the PSD is outside an outer boundary, inside the outer boundary, or inside an inner boundary, wherein the outer boundary and the inner boundary are defined within the storage and are specific to a first venue, and

(B) whether the PSD has qualified as a first fan device at the first event in the first venue by remaining within the inner boundary for a qualified time interval, wherein the qualifying time interval is defined in the storage.

30. The system of claim 1, wherein the FSA further

(vii) displays through the user interface an interactive game or contest,

(viii) receives user input regarding the game or contest through the user interface,

(ix) transmits the user input regarding the game or contest through one of the wireless communication systems to the FNMS, and

(x) receives from the FNMS through one of the wireless communication systems an indication that the user has won a memento, reward, prize, or points as a result of the transmitted user input.